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THE NATURAL RESOURCES AND ECONOMIC CONDITIONS OF THE STATE OF TEXAS.

THE MERCHANTS' ASSOCIATION OF NEW YORK

THE NATURAL RESOURCES AND ECONOMIC CONDITIONS OF THE STATE OF TEXAS

REPORT OF AN EXAMINATION MADE BY A SPECIAL COMMITTEE OF THE MERCHANTS' ASSOCIATION OF NEW YORK, BY INVITATION OF THE GOVERNOR AND LEGISLATURE OF TEXAS

DECEMBER, 1901

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The Merchants' Association
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RESOLUTIONS.

AT a meeting of the Board of Directors of The Merchants' Association of New York, Thursday, December 5, the following preambles and resolutions were adopted by a unanimous vote:

WHEREAS, the Hon. Joseph D. Sayers, Governor of the State of Texas, in an address to a large number of merchants, at a reception given at the Merchants' Club in October, 1900, invited The Merchants' Association and the Chamber of Commerce to send committees to the State of Texas for the purpose of studying the economic conditions of that State, which invitation was subsequently concurred in by an official resolution of the Legislature of the State of Texas; and,

WHEREAS, in accordance with such invitation, William F. King, then President of The Merchants' Association, appointed a committee of thirty members, who visited Texas as the guests of a committee representing that State, appointed by the Speaker of the House of Representatives, in accordance with the invitation extended by that body, which committee received unbounded hospitality at the hands of the Texas Reception Committee, the State officials and the people of Texas, and were given every facility possible within the limit of time at their disposal to visit the principal points of interest in the State, and to study the conditions therein; now, therefore, be it

Resolved, That we, the Directors of The Merchants' Association, hereby express our thanks to the Hon. Joseph D. Sayers, Governor of the State of Texas; to the Legislature of that State; to the Hon. R. E. Prince, Speaker of the House of Representatives of that State, by whom the Reception Committee was appointed; to Edwin Chamberlain, Esq., chairman of the State Reception Committee; to S. P. Skinner, Esq., vice-chairman; to Louis J. Wortham, Esq., secretary, and the fourteen other members of the State Reception Committee; to the various local committees in the

different cities and towns visited by the Committee, and to the many citizens of the State who aided the State Committee and the local committees in entertaining the two visiting committees; as well as the railroads, telegraph companies, newspapers and other corporate or private interests, for the numerous courtesies extended by them; and be it further

Resolved, That the Board of Directors of The Merchants' Association hereby approves the report of the chairman and secretary of the Association's Committee, and of the various sub-committees, now presented and entitled "The Natural Resources and Economic Conditions of the State of Texas," and extends its thanks to the members of the Committee for their intelligent and careful performance of the work delegated to them; and directs that the report of the Committee be printed, together with these resolutions, duly certified by the signatures of the president and the secretary, and by the official seal of The Merchants' Association of New York.

[Signed]

Attest:
JOHN C. EAMES,
Secretary.

D. LE ROY DRESSER,
President.

New York, Dec. 5, 1901.

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INTRODUCTORY.

To the Directors of The Merchants' Association of New York.

THE special committee of the Merchants' Association of New York, appointed in March last by Mr. William F. King, then president, for the purpose of visiting the State of Texas in response to an invitation extended by the Legislature of that State, submit herewith a report of their tour.

It may be well to preface the report by a statement of the conditions which led to the invitation and the subsequent tour through the State for an examination of its resources and economic conditions. The Chamber of Commerce of the State of New York and The Merchants' Association of New York raised a large fund for the relief of Galveston after the terrible hurricane of September 8, 1900. The Honorable Joseph D. Sayers, Governor of Texas, came to New York in the following month to attend a bazaar for the benefit of Galveston's orphans, under the auspices of one of the metropolitan newspapers. Acting for the State of Texas, he made an official call upon the officers of the Chamber of Commerce and The Merchants' Association, to thank them in the name of the State for the generous aid given by the relief committees of these two organizations to the distressed citizens of Galveston. He was given a reception at the Merchants' Club, which was largely attended by the members of The Merchants' Association. Mr. John Claflin, chairman of the Galveston Relief Committee of The Merchants' Association, and also a member of the Relief Committee of the Chamber of Commerce, presided.

On this occasion Governor Sayers made an eloquent address expressive of the deep gratitude felt by the people of Texas for

the generosity shown by New York. In the course of his remarks he expressed the wish that the incident might open the way for intimate and friendly relations; and that it might lead his hearers to a knowledge of the resources of Texas, and the inviting opportunities which it presents to capital. Continuing, he said:

> "Now, I am going to make you this proposition, gentlemen: That this great association, representing as it does energy, enterprise, ability and wealth, appoint three of its own members, or five, if it pleases, as a committee to visit our State. I extend to them right here the invitation, and I will lay before them every law that is on the statute book; I will give them the entry to every department of Government, and, after that I, or some one representing me, will accompany the committee to every section of the State. Upon the report of that committee, based on its investigations, I am willing to stand or fall."

The Governor then told of some of the conditions that make the industrial development of Texas an inviting field to capital, and protested against the erroneous belief that Texas laws are hostile to outside capital, especially to corporate capital. He declared this untrue, and therefore he was desirous that wrong impressions which had become current should be dissipated by the personal observation of delegates from the two great business organizations of the metropolis.

The invitation so extended by Governor Sayers was officially endorsed by the Texas Legislature, which, by unanimous vote, adopted the following

JOINT RESOLUTIONS.

> *Be it Resolved* by the House of Representatives, That in behalf of the people of the great State of Texas, who are desirous of encouraging the establishment of industrial enterprises, especially cotton, wool

and shoe factories, and with the further object of developing our great mineral resources; and

WHEREAS, It is a recognized fact that the State of Texas offers advantages for all classes of industries superior to any other State in the Union by reason of its diversified resources, mild and healthful climate, rich and productive soil, vast territory, Gulf ports and railroad facilities, thereby reducing the cost of transportation, being the greatest cotton, wool and stock producing State in the Union; and

WHEREAS, His Excellency, the Governor, did invite a committee to be appointed by The Merchants' Association and the Chamber of Commerce of the City of New York to visit the State of Texas for the purpose of investigating our resources and for the further purpose and object of investing capital in factories and legitimate enterprises; and

WHEREAS, The appointment of said committee by The Merchants' Association and the Chamber of Commerce is now awaiting the bidding of the Governor to visit us at his pleasure; therefore be it

Resolved by the House of Representatives of the State of Texas, That we heartily endorse the action of the Governor and join him in his invitation to said committee; and be it further

Resolved, That we invite the establishment of legitimate enterprises of every kind in our State, assuring them of every just encouragement and protection; be it further

Resolved, That the Speaker extend an invitation to one citizen from each Congressional district to cooperate with the Governor in showing the committee the various sections of the State, and accompany said committee through his district of the State; be it further

Resolved, That a copy of this resolution be forwarded to The Merchants' Association and Chamber of Commerce of the City of New York.

In accordance with these resolutions, the Hon. R. E. Prince, Speaker of the Texas House of Representatives, appointed a committee, composed of one business man from each Congressional district of the State, to receive the delegates from The Merchants' Association and the Chamber of Commerce, and to escort them upon a tour throughout the State.

The following gentlemen comprised

THE TEXAS STATE RECEPTION COMMITTEE.

EDWIN CHAMBERLAIN, Chairman.....San Antonio.
S. P. SKINNER, Vice-Chairman.....Waxahachie.
LOUIS J. WORTHAM, Secretary.....Austin.
E. H. R. GREEN.....Terrell.
H. B. RICE.....Houston.
J. A. KEMP.....Wichita Falls.
E. J. FRY,.....Marshall.
B. B. PADDOCK.....Fort Worth.
J. W. RIGGINS.....Waco.
R. J. KLEBERG.....Alice.
W. A. WILLIAMS.....Greenville.
W. W. HOSKINS.....Velasco.
W. C. HARGROVE.....Pittsburg.
J. M. PIERSON.....McKinney.

The Merchants' Association, at a special meeting of the Board of Directors, accepted the invitation unanimously on behalf of the Association, and requested Mr. William F. King, the president, to appoint a committee of thirty. Mr. King designated Mr. William R. Corwine, of the office of The Merchants' Association, as his representative, to arrange for the trip, and the following committee was appointed:

DELEGATES OF THE MERCHANTS' ASSOCIATION.

ALVAH TROWBRIDGE, Chairman; President Ninth National Bank and President American Bankers' Association.

DICK S. RAMSAY, President Hide and Leather National Bank.

WILLIAM G. HOOPLE, Investor and Director Hide and Leather National Bank.

GEORGE C. POTTER, Hutchens & Potter, Manufacturers, Johnstown, N. Y.

CHARLES B. KNOX, Manufacturer, Johnstown, N. Y.

C. M. WICKER, H. B. Hollins & Co., Bankers, and Vice-President Ft. Worth & R. G. R. R.

H. A. METZ, President Victor Koechl Co.; Member New York Board of Education.

H. ELMER GIBB, Mills & Gibb, Dry Goods Importers.

FRANK L. SHELDON, Frank L. Sheldon & Co., Brokers.

GUSTAV A. JAHN, G. A. Jahn & Co., and President Atlantic Rice Mills Co.

D. LE ROY DRESSER, Dresser & Co., Dry Goods Commission Merchants.

REV. JOSEPH NEWTON HALLOCK, D. D., Editor and Proprietor *The Christian Work.*

WILLIAM H. GRATWICK, Investor and Specialist on Lumber, Buffalo, N. Y.

C. T. ROOT, President Textile Publishing Co. and Editor *The Dry Goods Economist.*

GEORGE CLINTON BATCHELLER, G. C. Batcheller & Co., Manufacturers.

HENRY B. COSGROVE, Broker.

W. A. MARBLE, Vice-President R. & G. Corset Co.

DR. GEORGE A. SOPER, Sanitary Engineer and Chemist.

THOMAS CRIMMINS, J. D. & T. C. Crimmins, Engineers.

MANLY A. RULAND, Ruland & Whiting, Real Estate.

JOHN H. PYNES, Manufacturer Knit Goods, Waterford, N. Y.

C. H. KAVANAUGH, Manufacturer Knit Goods, Waterford, N. Y.

JAMES B. DILL, Counsel to The Merchants' Association.

CHARLES G. CRAWFORD, Wynkoop-Hallenbeck-Crawford Co., Printers and Publishers.

FRANK NICHOLSON, Investor and Mining Expert.

G. W. GRAHAM, Broker.

S. CRISTY MEAD, Assistant Secretary of The Merchants' Association.

WILLIAM R. CORWINE, of The Merchants' Association, and Secretary to the Committee.

N. FLANTER, Official Stenographer of The Merchants' Association and of the Committee.

The Chamber of Commerce having likewise accepted the invitation of Governor Sayers, Mr. Morris K. Jesup, the president of that organization, appointed a committee of ten to represent that body. The following gentlemen were of the visiting party:

DELEGATES OF THE CHAMBER OF COMMERCE.

CHARLES M. JESUP, Chairman; Vice-President Securities Company of New York.

W. C. LE GENDRE, Secretary; Brown Bros. & Co., Bankers.

EDWARD N. TAILER, Retired Merchant and Capitalist.

W. N. COLER, JR., Banker, W. N. Coler & Co.

H. C. BERLIN, Merchant; Director Knickerbocker Trust Co.; Director Bowery Savings Bank.

MAJOR T. J. HURLEY, Vice-President The Exploration Co.

RICHARD DEEVES, Richard Deeves & Son, Contractors and Builders.

C. T. COLLINGS, Merchant, Cincinnati, O., Representing the Standard Oil Co.

F. B. THURBER.

Many of the members of the two committees, besides representing the interests set opposite their names, are also directors

in various other corporations, with important and widely diverse business and investment connections.

Mr. Jesup and Mr. Corwine co-operated in directing the details of the proposed trip, and through the officials of the Pennsylvania Railroad Company arranged for the train and all transportation details.

A finely equipped special train, consisting of four compartment cars, a diner and a combination smoker and baggage-car, was provided for the continuous use of the committee during the entire tour. It was said by the railway officials to be the handsomest train which ever went from New York.

The train was in the personal charge of Mr. W. W. Lord, Jr., Assistant General Eastern Passenger Agent of the Pennsylvania Railroad Company, who was appointed to look after the comfort of the two committees, which function he performed with great efficiency.

The start was made from Jersey City April 20 at 10.15 A. M. The train ran to Philadelphia as a section of the Chicago Limited, and from that point ran as a special via the Pennsylvania Central Railroad to Washington; thence over the Southern Railway to Lynchburg; over the Norfolk & Western to Bristol; over the Southern Railway to Chattanooga; over the Alabama Great Northern to Meridian, and over the New Orleans Northeastern to New Orleans, which was reached Sunday, April 21, at 9.40 P. M. The actual distance traversed from Jersey City to New Orleans was 1,336 miles; the actual running time was thirty-six hours and twenty-four minutes, beating all previous records.

At New Orleans the delegates were met by the Texas State Reception Committee and escorted to the St. Charles Hotel, where they remained over night.

The committee had been previously invited by Stuyvesant Fish, Esq., the president of the Illinois Central Railroad Company, to be the guests of that company in New Orleans, and to inspect the great terminal works built by the company during recent years which have so greatly stimulated grain shipments from New Orleans.

On Monday morning, therefore, the railroad officials, after

a trolley tour to give the visitors a view of the city, took them on a trip up and down the river on a tug to inspect the long water front, the miles of shipping and the splendid terminal facilities of the Illinois Central Railroad. Luncheon was served on the tug.

At 9.30 o'clock that night, Monday, April 22, the train left for Texas in charge of the Texas State Reception Committee.

The committees arrived at Orange, on the border of Texas, at 7 o'clock the following morning, Tuesday, April 23. There they were met by the local committee and the Hon. R. E. Prince, Speaker of the House of Representatives, who represented the Hon. Joseph D. Sayers, Governor of the State of Texas, and who officially welcomed the committees.

From Orange the committees traveled through Texas, stopping at the following cities, town and villages in the order named:

Beaumont,
The Beaumont Oil Fields,
Sabine Pass,
Houston,
La Porte,
Galveston
Sugar Lands,
San Antonio,
New Braunfels,
Austin,
Burnett,
Marble Falls,
Llano,
Temple,
Waco,
Fort Worth,
Cleburne,
Brownwood,
San Angelo,
Ballinger,
Wichita Falls,
Quanah,
Dallas,
Waxahachie,
Marlin,
Calvert,
Bryan,
College Station,
Corsicana,
Ennis,
Greenville,
Sulphur Springs,
Texarkana,
Paris,
Sherman,
Denison,
Gainesville,

which was the last place of entertainment in the State.

From Gainesville the committees returned to Denison and thence started homeward over the Missouri, Kansas & Texas

Railway. The train left Denison Tuesday, May 7, at 11.00 P. M. and arrived at St. Louis at 6.10 P. M. the following night. This also was a record-breaking run.

The officials of the Missouri, Kansas and Texas road took charge of the train, and, under orders from the executive officers, ran it as a special from Denison to St. Louis, free of all railway charges, showing the committees every possible courtesy.

At St. Louis the committees were met by Mr. W. W. Lord, Jr., Assistant General Eastern Passenger Agent of the Pennsylvania Railroad Company, who had left the train at New Orleans. He once more took charge of the committees.

The train left St. Louis at 6.35 o'clock the same evening over the Vandalia line to Indianapolis; then proceeded over the Pittsburg, Chicago, Cincinnati & St. Louis Railroad to Columbus; over the Cincinnati, Akron & Columbus and Cleveland & Pittsburg Railroads, to Cleveland; over the Lake Shore & Michigan Southern to Buffalo, where it arrived at 5.25 P. M. The committees were joined at that city by Mr. H. C. Parry, the Buffalo Passenger Agent of the New York Central & Hudson River Railroad Company. The train was run over the Belt Line to the grounds of the Pan-American Exposition, where the committees were given an opportunity to inspect the grounds, and where they were officially received by the Mayor of Buffalo and the officers of the Exposition. The train left there at 7.15 P. M., making a through run to the Grand Central Station, arriving there at 7 o'clock the following morning, May 10.

The total number of miles traveled on this trip was 6,198, of which 2,800 miles were within the State of Texas.

During the whole trip there was not an accident or an unpleasant incident of any kind.

We desire to express our thanks to Governor Sayers and the Legislature of the State of Texas for having invited us, to The Merchants' Association for having appointed us, to Mr. Edwin Chamberlain, chairman; Mr. S. P. Skinner, vice-chairman; Mr. Louis J. Wortham, secretary, and all the members of the Texas State Reception Committee; to the Hon. R. E. Prince, Speaker of the House of Representatives of the State of Texas; to the press of the State and its representatives, and the Associated

Press and its representatives who accompanied us on the trip throughout the State; to all the railroad officials, as well as the officials of the Western Union and Postal Telegraph companies who placed the use of their wires at our disposal free for the purpose of sending messages to our homes while in Texas; to every man, woman and child whom we met in Texas, and, in fact, to every one who had anything to do with the trip or our reception, directly or indirectly, for the uniform kindness and courtesy shown us, and for all that was done for our entertainment, comfort and happiness.

It would be impossible to put into words the courtesy that was shown us by the Texas State Reception Committee, by the committees which had been organized in the various cities and towns that we visited to receive and care for us, or by the people themselves who helped entertain us and who did all in their power to make our visit a pleasant one.

If we were to recite, or even attempt to summarize this courtesy, it would take a whole volume, and, therefore, we must content ourselves with making a general expression for all.

The trip will ever remain in our memories as one of the pleasantest incidents of our lives, in which we formed acquaintances that ripened into friendship that we hope will be lasting—by which our vision was broadened, and through which we came to a better understanding of the conditions existing in the State of Texas, of its progressiveness and of the warm-hearted hospitality of its people, than we could possibly have obtained in any other way.

The chairman of the committee of The Merchants' Association appointed several sub-committees for the purpose of studying the subjects assigned to them. These sub-committees were made up as follows:

Committee on Law and Legal Matters Generally:
JAMES B. DILL, Counsel for The Merchants' Association.

Committee on Banking:
DICK S. RAMSAY, Chairman; WILLIAM G. HOOPLE, FRANK L. SHELDON.

Committee on Transportation and Export Facilities:
WILLIAM R. CORWINE, Chairman; HENRY B. COSGROVE, C. M. WICKER.

Committee on Agricultural Resources:
S. CRISTY MEAD, Chairman; MANLY A. RULAND, GUSTAV A. JAHN.

Committee on Mineral Resources:
FRANK NICHOLSON, Chairman; THOMAS CRIMMINS, H. A. METZ.

Committee on Lumber:
WILLIAM H. GRATWICK.

Committee on Cotton Piece Goods Manufacturing:
JOHN H. PYNES, Chairman; C. H. KAVANAUGH, C. T. ROOT, G. W. GRAHAM.

Committee on General Manufacturing:
D. LE ROY DRESSER, Chairman; W. A. MARBLE, G. C. BATCHELLER, H. ELMER GIBB.

Committee on Educational Facilities:
REV. JOSEPH NEWTON HALLOCK, D. D., Chairman; CHARLES G. CRAWFORD, H. A. METZ.

Committee on Sanitary and Climatic Conditions:
DR. GEORGE A. SOPER.

Committee on Labor:
C. B. KNOX, Chairman; GEORGE C. POTTER.

When these several committees were formed it was assumed that ample statistical data as to the natural resources of the State and their present development and all other economic conditions would be readily accessible from official sources. The proposed function of the committees was, therefore, the careful observation of established conditions of fact, with a view to estimating and reporting upon their probable opportunities of profitable future development.

Much to the disappointment and embarrassment of the various committees it has been found that the official data collated by the State of Texas are exceedingly meager, and that no comprehensive view of the actual and potential economic condi-

tions of the State can be gathered from its public documents. The State government seems almost blind to the great importance of public reports containing accurate and complete exhibits of the natural resources and industrial possibilities of the State.

Such reports are indispensable to promote the influx of immigration and outside capital essential to industrial development, which demand reliable information as a prerequisite to direct their movement. There is a notable lack of such information as to Texas, and in all probability the State has been much prejudiced thereby. Instances are seen in its deficient labor supply, due in part to the absence of a considerable immigration from European countries, and to the distrustful attitude of outside capital, which has long standing but for the most part groundless prejudices against investment in Texas, based upon misconception and dense ignorance of actual conditions.

It is manifestly impossible, no matter how great the industry and skill applied, to collate and digest during a rapid tour of several thousand miles within a period of two weeks, the vast body of basic data necessary for the purposes of the committees. By reason of the paucity and irrelevance of the public reports of the State the difficult task of gathering the required data from other and detached sources was imposed upon the committees. This was of necessity largely effected by correspondence and through the hearty co-operation of numerous gentlemen residing in various parts of the State, particularly railroad officials, who have done much to fill the gaps left by the defective public reports. Through these unofficial channels has been gathered a body of material, ample as to most subjects, for the purposes of the committee. It comprises numerous monographs, published by various associations, institutions and individuals, supplemented by much valuable unpublished data, collated for the committee by Texas specialists, qualified by thorough personal knowledge of the conditions, to present them faithfully and fully.

In some branches of inquiry satisfactory data are unobtainable, no scientific collation of the necessary statistics having hitherto been made. In these cases our report reflects only

general conditions. It is believed, however, that despite these inevitable omissions, the following pages afford a much more comprehensive and well-rounded exhibit of the economic development and possibilities of Texas than can elsewhere be found in accessible form.

It is the sense of the committee that the State of Texas would be greatly benefited by comprehensive public reports that would fully exhibit its economic, financial and industrial conditions by the approved methods of statistical science.

Creditable exceptions to the general defectiveness of Texas public reports are those of the State Geological Survey and of the State Railroad Commission. The latter are among the most thorough, useful and intelligent published by any public authority anywhere in the United States. The geological reports are of great merit, but as yet they cover but a very small part of the State. By far the most comprehensive data accessible are supplied by the various departmental publications of the United States Government, especially those of the Geological Survey, the Census Bureau and the Department of Agriculture.

Much valuable information not elsewhere obtainable has been drawn from the Document Division of the Library of Congress, and many thanks are due to Roland P. Falkner, Esq., chief of that division, for his courteous and valuable assistance, which enabled the committee to consult a large body of useful data, as well as to Frederick B. De Berard, Esq., of The Merchants' Association, who went to Washington and compiled the data and who has rendered valuable assistance in the preparation of the report, co-operating heartily with the sub-committees, more particularly those on agriculture and railroads.

Respectfully submitted,

ALVAH TROWBRIDGE,
Chairman.
WILLIAM R. CORWINE,
Secretary.
For the Committee.

New York, Nov. 1, 1901.

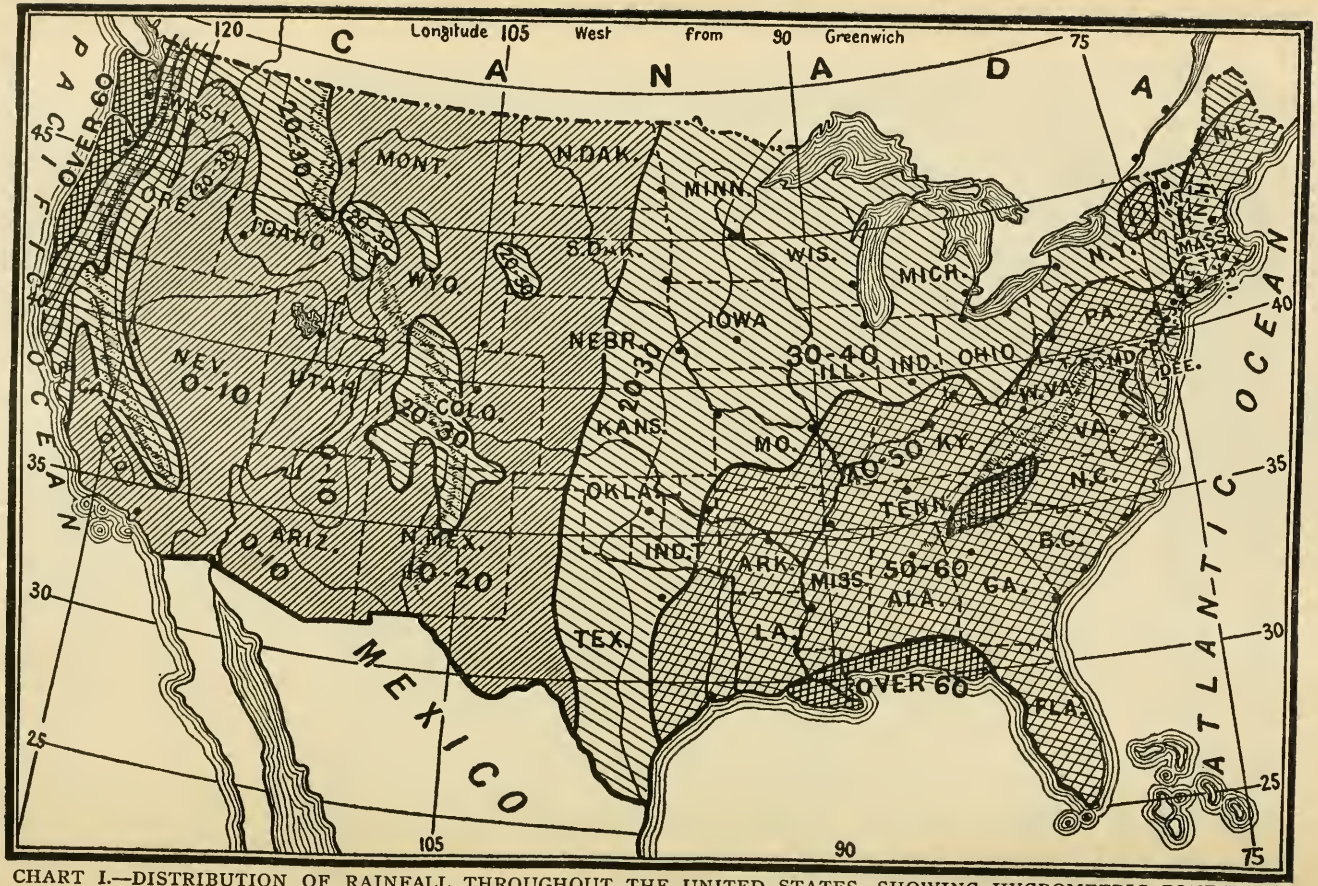

CHART I.—DISTRIBUTION OF RAINFALL THROUGHOUT THE UNITED STATES, SHOWING HYGROMETRIC ZONES AND INCHES OF ANNUAL PRECIPITATION IN EACH.

WATER SUPPLIES OF TEXAS.

FROM a geographical standpoint the State of Texas may be considered as a great area of country arranged in a series of broad, irregular steps, which slope from the Cordilleras in a southeasterly direction toward the Gulf of Mexico. In the center of the State, and in the extreme west, the comparative uniformity of the incline is broken by small mountains. The highest step is the territory of the Great Plains. It extends from the Panhandle south to near the latitude of Del Rio, and is bordered on the east by the gypsum and red lands of Central Texas. The red lands form the second step, and the third comprises the black prairies in the east center part of the State. Finally we have the low coast and flat land bordering on the eastern boundary for the lowest step in the series.

RIVER SYSTEMS.

THERE are no mountains within the State which give rise to important river systems. The Pecos, Canadian and Rio Grande take their rise in the Rocky Mountains outside of the boundaries of Texas and derive no important part of their volume from this country. The drainage of the State is carried off by streams which rise on the edge, or south or east, of the Great Plains. The Plains themselves have no true rivers. The Canadian River flows through a deep valley far below the level of the country which it traverses, and consists for the most part of little more than a strip of wet sand. The Pecos flows between high banks for nearly the whole of its journey through Texas. The Rio Grande from El Paso to Del Rio flows in deep canyons, after which it opens into a broad and shallow valley, which gradually flattens out as the river approaches the coast. About 100 miles of its 1,500 miles of length are navigable.

The water which falls upon the plains is quickly absorbed or evaporated. Occasionally shallow draws carry off the excess of water which falls in the form of rain, but for the most part these channels are dry and of no service as sources of water supply. They form the headwaters of such streams as the Llano, Guadalupe, Frio, Nueces and Devil rivers.

But if the plains do not possess important watercourses their steep eastern slopes give rise to springs which form the beginnings of the longest and most important rivers within the State. The rivers which rise at the edge of the plains soon sink deep into the ground and flow through canyons. Little drainage comes to them at first as they proceed to the sea, but their valleys gradually broaden until their alluvial bottoms are famous for their fertility. Among such rivers may be mentioned the Wichita, Red, Brazos and Colorado and their numerous tributaries.

Drainage in East Central Texas is carried on by a network of river systems. Part of the time the smallest of these rivers are nearly or quite dry, but during storms they carry large quantities of the rain water which falls upon the surrounding prairies.

The eastern part of the State is drained by the Sabine, Sulphur, Neches, Angelina and many small, sluggish creeks and bayous. West of the Colorado several small rivers issue from huge springs. Among these are the San Marcos, San Antonio, San Gabriel and Comal rivers.

Few of the rivers of Texas have been gauged, and there has been little or no development of the streams for power purposes.

RAINFALL.

THE water supplies of the State, including the water carried by the rivers, are derived from rainfall. In Northern Texas the rainfall is distributed in accordance with what is known as the plains type. Characteristics of the plains type are a scant precipitation in the winter months and showers, with thunder and lightning, in summer. West of the 101st meridian the rainfall is precarious and generally insufficient for the maturity of crops.

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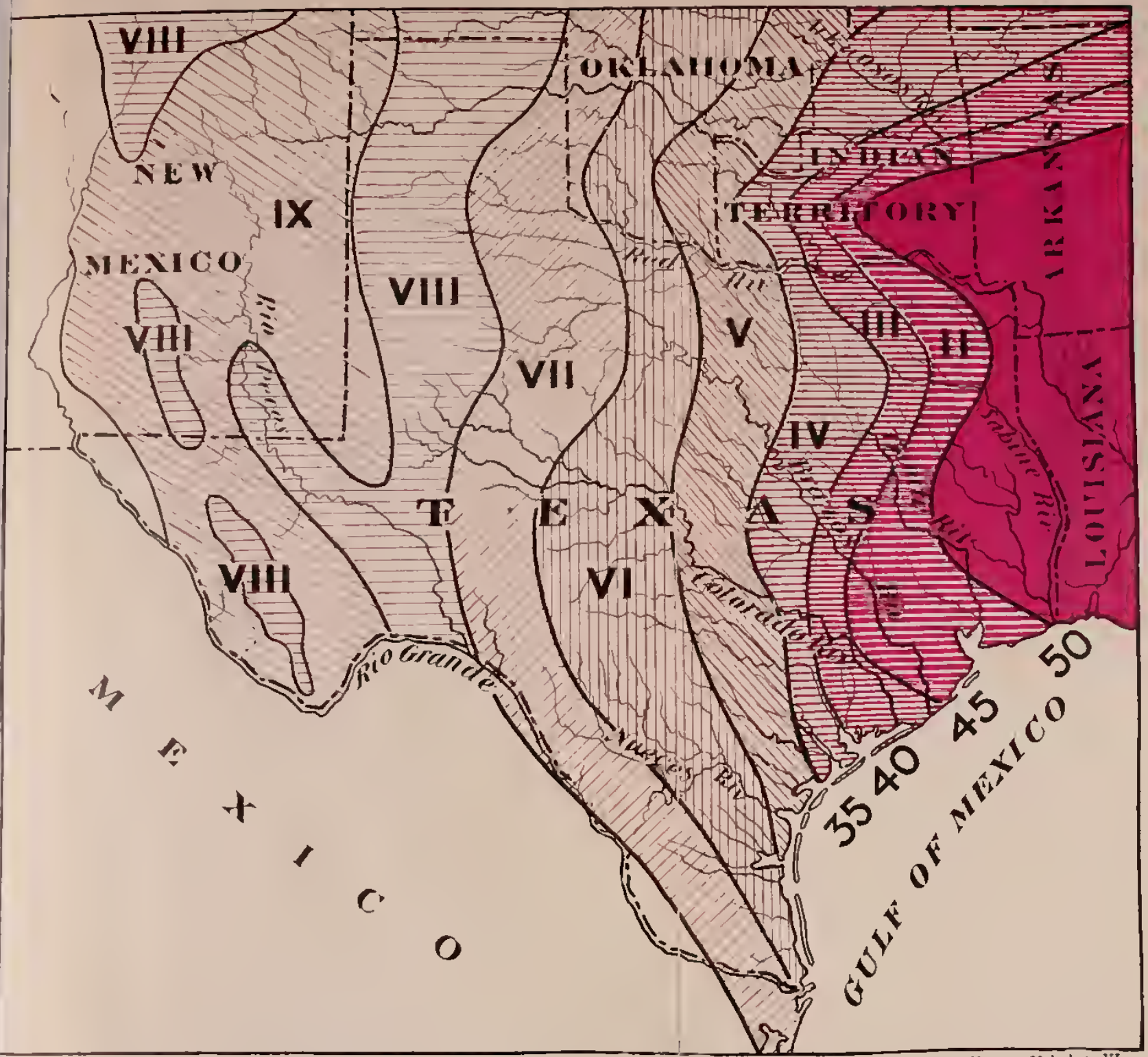


CHART II.—PRECIPITATION IN THE TEXAS REGION. I., over 50 inches; II., over 45 inches; III., over 40 inches; IV., over 35 inches; V., over 30 inches; VI., over 25 inches; VII., over 20 inches; VIII., over 15 inches; IX., over 10 inches.

On the coast the annual average of rainfall is abundant, but its distribution is not always as reliable as could be desired. The greatest irregularity occurs in September and October. The heaviest rainfall takes place in June, August and September. In the eastern part of Texas a fall of from 50 to 60 inches of rain is the usual average. Proceeding westward, the annual average falls off at the rate of about four inches per sixty miles until it reaches nine inches in the extreme corner of the Panhandle.

The amount of water which is available from the rainfall for purposes of water supply depends upon a large number of conditions. The percentage of run-off varies with the porosity of the soil, the slope and character of the ground, the length and severity of the storm and the state of vegetation. The limits are so widely separated and the problem so involved that broad generalizations are practically impossible for the great territory under consideration.

In the sandy, forest-covered country of the Cross Timbers the run-off is very small; practically all of the 30 inches or more of rain which falls annually is absorbed. Part of this water sinks deep into the earth and finally escapes in springs and deep wells at great distances from the points where the rain fell.

In the "Black Waxy" district the abundance of clay in the soil prevents the water from percolating rapidly, and the percentage of water which runs off to the streams during rainstorms is considerable.

In the southeast the land is low and flat and the drainage poor. Where the land is elevated and the soil is sandy, the larger part of the rainfall is absorbed; the precipitation here exceeds 50 inches and gives rise to an abundant growth of forest trees.

The red land country has soils which vary from loamy to sandy. To the east and south the country is rugged and the proportion of the 25 inches of rainfall which runs off is irregular.

On the Staked Plains practically all of the 15 inches of rainfall is absorbed by the soil.

On the Trans-Pecos Mountains the run-off is high.

EVAPORATION.

AS to evaporation, it may be said that west of the black prairie country the evaporation exceeds the rainfall. In the Great Plains, where the precipitation is 20 inches, the evaporation is 60 inches.

QUALITY OF THE RIVER WATERS.

AS sources of drinking water the streams which agree with the principal type of Texas rivers are not wholly satisfactory. For most of their length the rivers carry silt and other suspended impurities, which render purification by subsidence and filtration desirable. Of the large number of rivers which take their rise in springs many descend rapidly to deep beds from which the water would have to be pumped at great expense. In the agricultural country the minor streams are generally highly colored with the soil through which they flow; and these smaller watercourses, acting as tributaries to large rivers, carry their unpleasant hue to a great distance. Even the clearest rivers at times becomes very turbid. It is said that at Austin freshets of the Colorado River are termed white rises, red rises and black rises, according as to whether the rainfall which caused the rise occurred in the white, red or black land drainage area of that stream. On the coast, and generally in South and East Texas, the rivers are alluvial.

Cities which draw upon rivers for the whole or part of their public water supplies are Cameron, Cuero, Greenville, Fort Worth, Victoria and El Paso. There are no municipal water filters in successful use.

IMPOUNDED WATER.

BUT if few of the cities of Texas can rely upon river water as a satisfactory source of supply, there are fewer yet which can take their water from natural ponds or lakes. In fact, lakes are not numerous, and those which exist are often saline. Impounded water collected from drainage areas into tanks is not generally used for drinking purposes. The city of Abilene uses a supply of impounded water.

UNI TY
CALI MIA

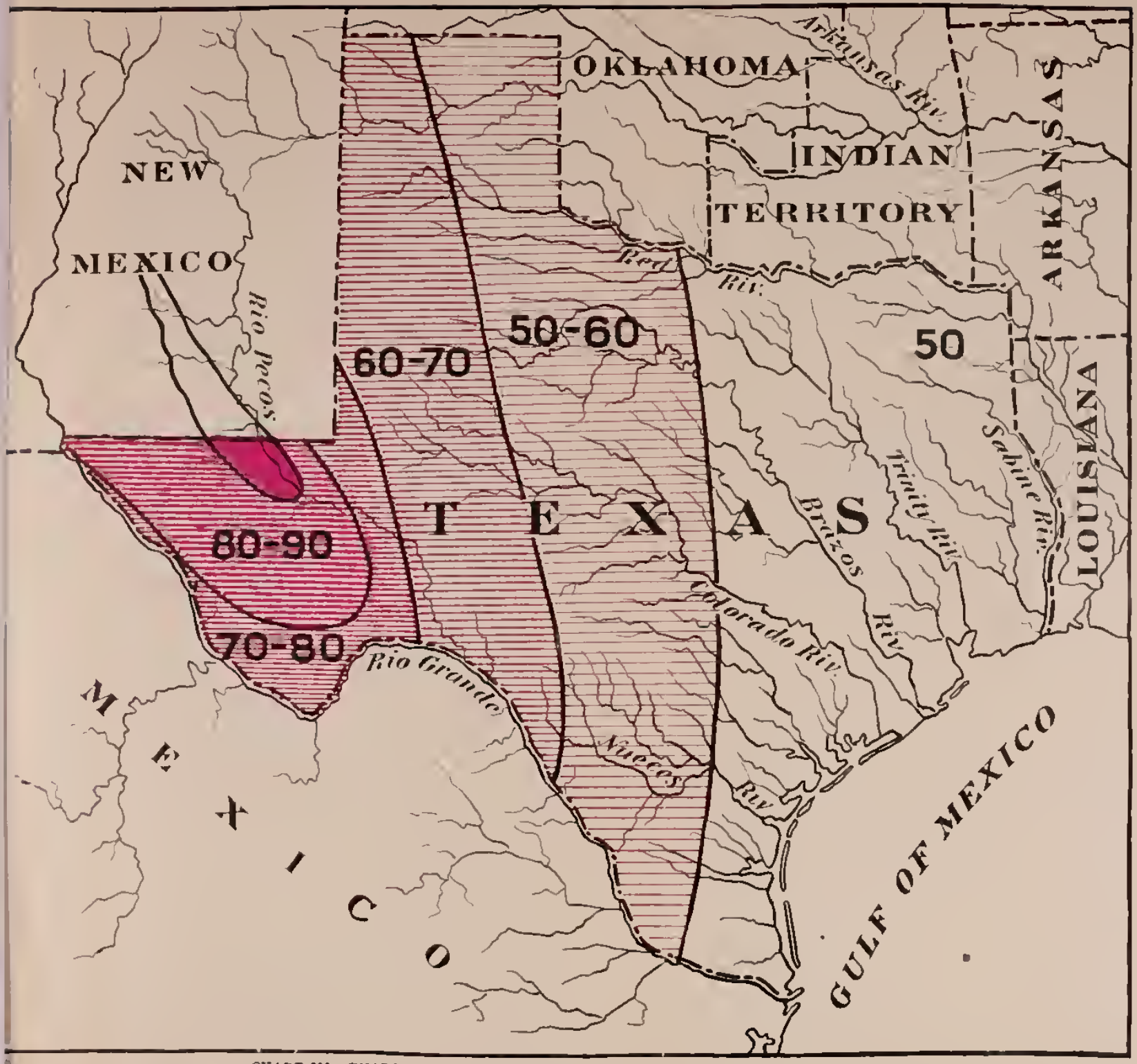


CHART III.—EVAPORATION IN THE TEXAS REGION IN INCHES PER ANNUM.

UNDERGROUND SUPPLIES.

TEXAS is particularly fortunate in having many excellent sources of water supply under ground. The porous soils found occasionally in certain portions of the State act as cachement areas which collect the water which falls in the form of rain and snow. The water so collected accumulates in great underground reservoirs of gravel and sand, underlaid with hard pan, which extend for long distances in nearly a horizontal direction. Where the surface of the land rapidly slopes down to the level of the water in these natural reservoirs, springs make their appearance. Perhaps the most notable area wherein such springs and free-flowing wells occur is along the great geological fault which runs from the neighborhood of San Antonio in a northeasterly curve through the rich agricultural country of the black prairies. In the line of this fault there is an abundance of underground water of a quality which makes it excellent for all purposes. Remarkable instances of the copiousness of this source of supply are found at New Braunfels and San Antonio and in the country between Corsicana and Brownwood.

Along the coast there are many points at which deep wells have been successful, those furnishing the public water supplies of Houston, Galveston, Velasco and Corpus Christi being excellent examples.

In the eastern part of the State artesian water is not so readily obtained, nor is it so much needed. Wells, giving moderate flows, are reported from Robertson, Limestone and Polk counties.

In the region of the Staked Plains there is said to be an abundance of water but a short distance below the surface of the ground. Shallow wells, operated by windmills, have been employed successfully in several parts of the Staked Plains, and it has been thought by some that the prospects for agriculture in that neighborhood only depend upon the possibility of irrigating extensively with water obtained in this way.

IRRIGATION.

SUCCESSFUL irrigation works have been operated in Texas since the earliest history of the State. In the neighborhood of San Antonio there still remain ditches constructed between

COMPARISON OF CAPACITY AND COST OF VARI

PLACE.	SYSTEM.	PUMP.
Orange	50 horse-power engine.	Menge.
Mexia	8-foot windmill.	
"	12-foot windmill, *a*.	
Abilene	Dam and ditch.	
Ballinger	" "	
San Angelo	" "	
North Concho	" "	
Sterling City	" "	
Brownwood	80 horse-power *b*.	Centrifugal.
Goldthwaite	32 horse-power engine, *d*.	Worthington.
Rattler	Turbine.	
Regency	20 horse-power engine, *e*.	
San Saba	30 horse-power engine, *f*.	
Menard County	18 horse-power engine.	Menge.
San Marcos	Water wheel.	
"	"	
San Antonio	Ditch.	
"	Ditch, *g*.	
"	Artesian Well.	
Floresville	40 horse-power boiler, *h*.	Blakeslee.
"	10 horse-power boiler, *i*.	Blake.
Cuero	2½ horse-power gasoline.	
Beeville	5½ horse-power gasoline.	
Mathis	100 horse-power boiler, *j*.	Menge.
"	40 horse-power boiler.	Double.
Del Rio	Dam and ditches.	
Laredo	80 horse-power boiler.	Pulsometer.
"	Windmill.	
"	12-foot windmill, *b*.	
Hidalgo	25 horse-power engine.	Centrifugal.
Brownsville	50 horse-power boiler.	Menge.
"	100 horse-power boiler.	Centrifugal.
"	14-foot windmill.	
Hale County	3 windmills.	
Crosby County	8-foot windmill, *b*.	
Pecos	Dam and ditch.	
"	" "	
Grand Falls	" "	
El Paso		

a. Combined water power and irrigation.
b. With reservoir.
c. Approximate.
d. Operating cost, $7 a day of twelve hours.
e. Can water five acres per day.

OUS SYSTEMS OF IRRIGATION WORK IN TEXAS.

LIFT. In Feet.	CAPACITY. Second-Feet.	ACREAGE. Irrigable.	ACREAGE. Irrigated.	COST. Total.	COST. Per Acre.	Annual Per Acre.
8	11.14	.....	500	$1,500 00	$3.00	.....
25	.....	15	7	300 00	43.00	.....
.....	.....	30	.....	485.00	16.00	.....
.....	.....	300	.....	25,000.00	.....	.....
.....	.....	50	10	200.00	20.00	.....
.....	.....	.....	470	.....	7.00	$ .75
.....	.....	350	250	3,500.00	14.00	.....
.....	.....	250	75	1,500.00	20.00	.....
.....	6.84	400	.....	.....	.....	.....
.....	2.72	80	75	2,000 00	27.00	*c*6.00
.....	.11	.....	5	.....	.....	.....
.....	1.00	75	.....	.....	.....	.....
.....	1.87	.....	40	2,000.00	50.00	.....
.....	2.60	.....	100	1,500.00	15.00	.....
.....	.20	.....	3	.....	.....	.....
.....	.32	.....	12	.....	.....	.....
.....	.....	600	100	.....	.....	2.00
.....	30.00	1,500	400	18,000.00	15.00	2.50
.....	2.32	1,000	250	3,000.00	.....	.....
50	1.67	400	100	2,500.00	.....	*c*4.00
48	.20	.....	.....	295.00	.....	.....
.....	.07	.....	10	450.00	.....	.....
48	.05	20	.....	.....	.....	.....
48	14.00	500	70	5,000.00	.....	1.00
39	.29	140	70	3,000.00	.....	.....
.....	.....	.....	3,600	25,000.00	.....	.50
65	1.11	125	50	.....	.....	.....
.....	.....	.....	3	220.00	.....	.....
30	.....	.....	5	425.00	.....	.....
.....	10.58	.....	100	.....	.....	.....
18	20.00	.....	200	2,000.00	.....	.....
22	17.82	300	200	.....	.....	.....
10	.....	.....	18	300.00	.....	.....
50	.....	25	.....	505.00	.....	.....
124	.....	.....	1½	222 00	.....	.....
.....	.....	40,000	6,000	150,000.00	10 00	1.50
.....	.....	20,000	600	35,000.00	5.00	.50
.....	.....	.....	.....	.....	15.00	1.25
.....	.....	30,000	3,000	220,000.00	.....	2.00

f. Operating cost, $3 per day of eleven hours.
g. Water rights held at $15.
h. Costs 12½c. per hour to operate.
i. Pumps into reservoir.
j. Operating expenses, $4.25 per day.

1716 and 1744 by the Spanish missionaries, who first settled in those parts. As is well known, the necessity for irrigation does not depend alone upon rainfall, but has equal reference to the properties of the soils and the character of the crops to be cultivated. In Texas the greater part of the irrigation works are not in the arid or semi-arid country, but in the southern half of the State or near the coast, where soil and rainfall might be expected to favor agriculture. In most cases irrigation is practiced because of eccentricities or a normal deficiency of rainfall.

Irrigation in Southeast Texas is important by reason of the favorable location of the land for rice growing. In the cultivation of rice the water is pumped from bayous directly upon fields which are diked to hold the water and ditched to drain them properly. The pumps are operated by steam and run continuously for two or three months at a time.

Near Galveston deep wells are sometimes pumped by windmill power for the benefit of orchards and gardens. Here the rainfall is somewhat uncertain during the growing season, and the readiness with which underground water can be obtained induces the farmers to adopt this cheap manner of insuring the maturity of their crops.

Near Wichita Falls, in North Central Texas, an extensive project for irrigating a large tract of land is under way. A reservoir to hold twelve thousand million cubic feet of impounded water has been formed and the water will be distributed upon land which has been unsuitable for agriculture by reason of droughts.

In the Concho Country a small number of irrigation works have been built by private persons for the benefit of stock and agriculture. At Menardville, in Menard County, is a plant which is said to give excellent satisfaction, the water being pumped from the San Saba River and used for general agriculture. Irrigation is practiced at San Marcos with water raised from ditches by wheels operated by the currents of the streams. In the country about San Antonio are many small irrigation works in which a few hundred acres of corn and cotton are cultivated and truck vegetables grown for the city market; the water is obtained from wells or by ditches leading from springs near by. At Cuero is located an irrigation plant designed to distribute the water of the Guadalupe River to some 4,000

acres of land. For this purpose the stream has been closed by a permanent stone and concrete dam. Land on the Nueces River has been irrigated with water taken from that stream and from artesian wells, the total area under cultivation being about 1,000 acres. There are a few irrigation works along the Rio Grande, notably those near Del Rio, Eagle Pass, Laredo, Hidalgo and Brownsville. The region of the Staked Plains is said to be supplied with water, which may be obtained from wells from forty to 200 feet deep. Examples are found in Hale, Crosby and Midland Countries. Windmills are used to pump the water, which is then allowed to flow into tanks. The tanks are, in reality, storage reservoirs made by raising a low embankment upon a suitable location and puddling the inside. Tanks are common in many parts of the cattle country of Texas, where they furnish a large part of the water used by stock. The water of the Pecos River is used to irrigate about 6,000 acres of land, divided into small lots under different management. About 8,000 acres are irrigated in the Trans-Pecos country near El Paso.

In an accompanying table will be found a list of irrigation works in Texas. The quantity of water required for irrigation varies greatly and it is difficult to make an estimate of the cost of irrigating. The size of the works, the height of lift, the kind of pump and price of fuel also serve to destroy the value of a general figure. It is stated, however, that an average acre of land in Texas will require 43,560 cubic feet of water for a crop. The cost of water rights has been given as $15 per acre. The cost of maintenance is from $1.50 to $2 per acre, excluding attendance. These figures appear to be too low.

As in California, Washington and Oregon, the law of Texas permits unappropriated waters, in those parts of the State in which irrigation is necessary through insufficiency of rainfall, to be appropriated by private persons or corporations for irrigation, mining, milling, the construction of water works for towns and cities and for stock raising.

PUBLIC WATER SUPPLIES OF FORTY TOWNS AND CITIES OF TEXAS.

	Population, 1900.	Ownership. P.—Private. M.—Municipal.	Source of Supply.	Consumption, Gallons per 24 hours.	Pressure, Pounds per Square Inch	Miles of Mains.	House Connections.	Cost of Works.	Annual Expenses.	Sewers.
1. Abilene	3,411	P	Impounded	700,000	70-130	14	650	$125,000	$8,000	None.
2. Baird	1,502	M	Wells	——	88	1½	——	10,000	420	"
3. Ballinger	1,128	M	Surface	——	——	1½	——	20,000	1,200	"
4. Cameron	3,341	P	River	500,000	45	5	300	40,000	700	"
5. Cisco	1,514	P	Surface	120,000	——	4	200	94,000	——	"
6. Cleburn	7,493	P	Wells	500,000	36-100	25	1,775	150,000	9,100	Separate system.
7. Colorado	1,874	P	"	75,000	50-93	7½	175	40,000	2,000	None.
8. Corsicana	9,313	P	"	500,000	50-100	11	500	120,000	12,500	Separate system.
9. Curo	3,422	M	River	400,000	45-100	7	700	47,000	3,000	None.
10. Dallas	42,638	M	"	4,500,000	60-85	96	5,000	1,250,000	26,000	Separate system.
11. Decatur	1,562	P	Wells	40,000	——	2½	150	21,765	1,200	None.
12. El Paso	15,906	P	"	1,500,000	75	12	2,000	200,000	——	Separate system.
13. Ferris	1,004	P	"	10,000	40	2	——	20,000	——	" "
14. Fort Worth	26,688	M	River	3,200,000	80-125	55	3,200	1,100,000	25,000	Sewers.
15. Gainesville	7,874	P	Wells	400,000	60-125	11½	750	——	——	Separate system.
16. Galveston	37,789	M	"	2,100,000	58-90	49	3,760	1,400,000	30,500	" "
17. Giddings	1,278	P	"	——	——	2	60	——	——	None.
18. Greenville	6,860	P	River	220,000	55-125	8	475	175,000	4,500	Sewers.
19. Groesbeck	1,462	M	River and Springs.	50,000	40-80	7	25	12,000	——	None.
20. Henrietta	1,614	M	Wells	50,000	110	4	100	17,000	720	"
21. Hico	1,480	M	"	10,000	50	¾	100	7,500	600	"
22. Itasca	1,277	M	"	100,000	120	6	300	20,000	900	.....
23. Ladonia	1,409	P	Surface	10,000	35-75	2	25	12,000	1,200	None.
24. Lampasas	2,107	P	"	——	——	3	200	45,000	——	"
25. Llano	1,462	P	"	500,000	45	12	200	20,000	1,000	"
26. Mexia	2,393	P	Springs and Wells.	35,000	40	5	463	40,000	2,100	"
27. Navasota	3,857	M	Wells	100,000	44-100	1½	——	18,000	——	"
28. New Braunfels	2,097	M	Springs	350,000	——	9	351	55,000	2,700	"
29. Palestine	8,297	P	"	750,000	50-68	16	——	147,000	6,000	Separate system.
30. Rockdale	2,515	P	Wells	150,000	45-80	4	30	40,000	2,750	None.
31. San Antonio	53,321	P	"	9,000,000	——	——	——	——	——	Separate system.
32. San Marcos	2,292	P	Springs	1,000,000	90-120	18	357	135,000	——	None.
33. Smithville	2,577	P	River	125,000	45-80	4¾	200	25,000	6,720	"
34. Stevenville	1,902	M	Wells	——	35-100	½	20	2,500	500	"
35. Taylor	4,211	P	River	——	——	——	——	——	——	"
36. Temple	7,065	P	"	——	——	8	2,500	65,000	——	"
37. Terrell	6,330	M	Wells	——	——	——	——	50,000	500	"
38. Victoria	4,010	M	River	300,000	40-100	10	350	70,000	3,000	"
39. Waco	20,686	P	Wells	4,000,000	45-80	80	5,000	——	——	Separate system.
40. Yoakim	3,499	P	"	300,000	40-120	10½	450	90,000	——	None.

About a dozen towns of 6,000 to 12,000 inhabitants have no sewerage systems.
There are six towns of 3,000 inhabitants which have neither public water supplies nor sewers.

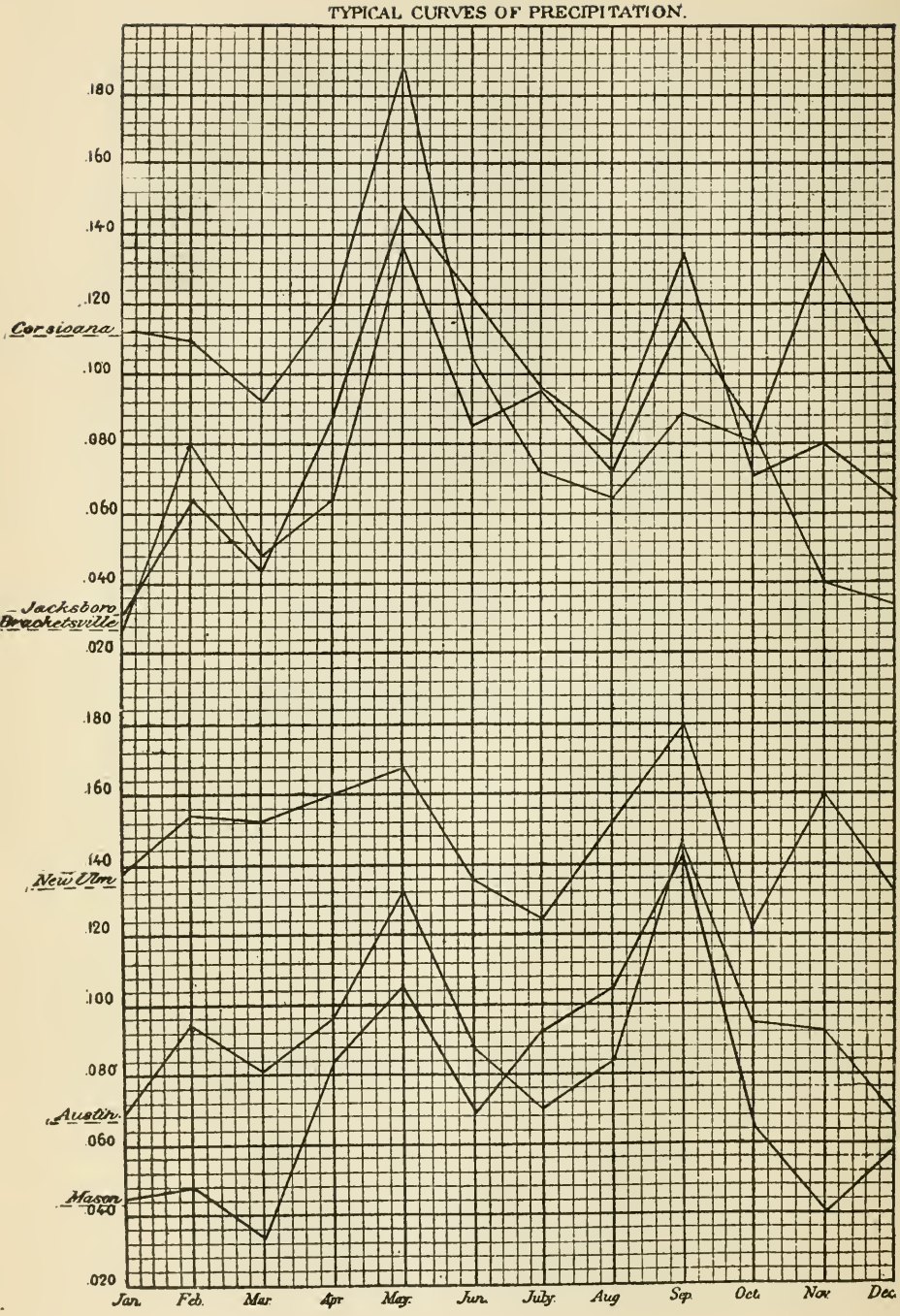
IN the preparation of the foregoing remarks upon the water supplies of Texas much useful information has been found in the official publications of the United States Department of Agriculture, especially in bulletins of the Weather Bureau; the Department of the Interior, through the Geological Survey, has furnished many important sources of data. It is a pleasure to record my obligations to the work of F. H. Newell, Robert T. Hill, William F. Hutson, Dr. I. M. Cline and Joseph L. Cline, of the Government Service.

Respectfully submitted,

GEORGE A. SOPER, Ph.D.
29 BROADWAY, NEW YORK.

Committee on Sanitary and Climatic Conditions.

October 22, 1901.


TYPICAL CURVES OF PRECIPITATION.
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.160
.140
.120
Corsicana
.100
.080
.060
.040
Jacksboro
Brackettsville
.020
.180
.160
140
New Ulm
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Austin
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Mason
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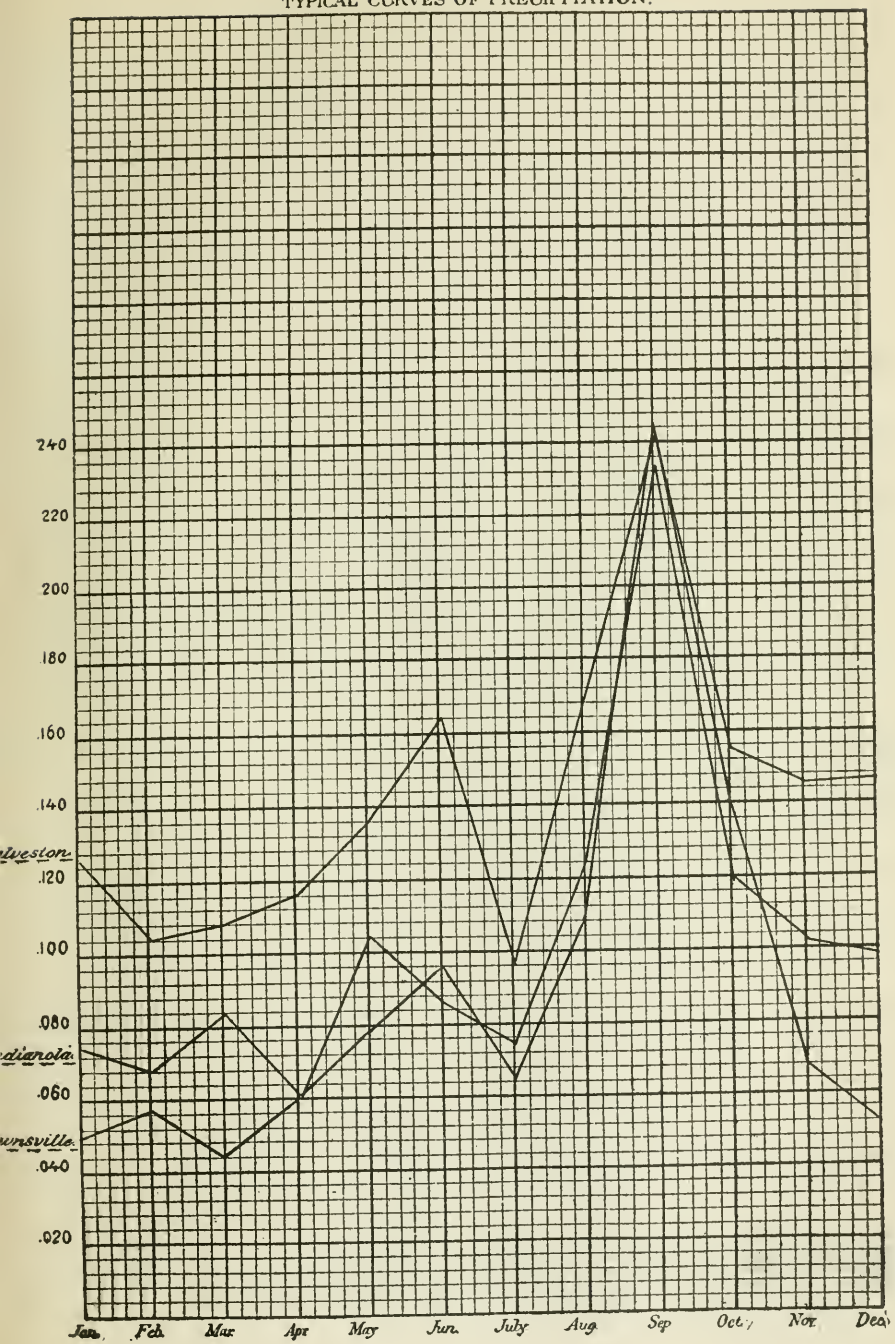
TYPICAL CURVES OF PRECIPITATION.



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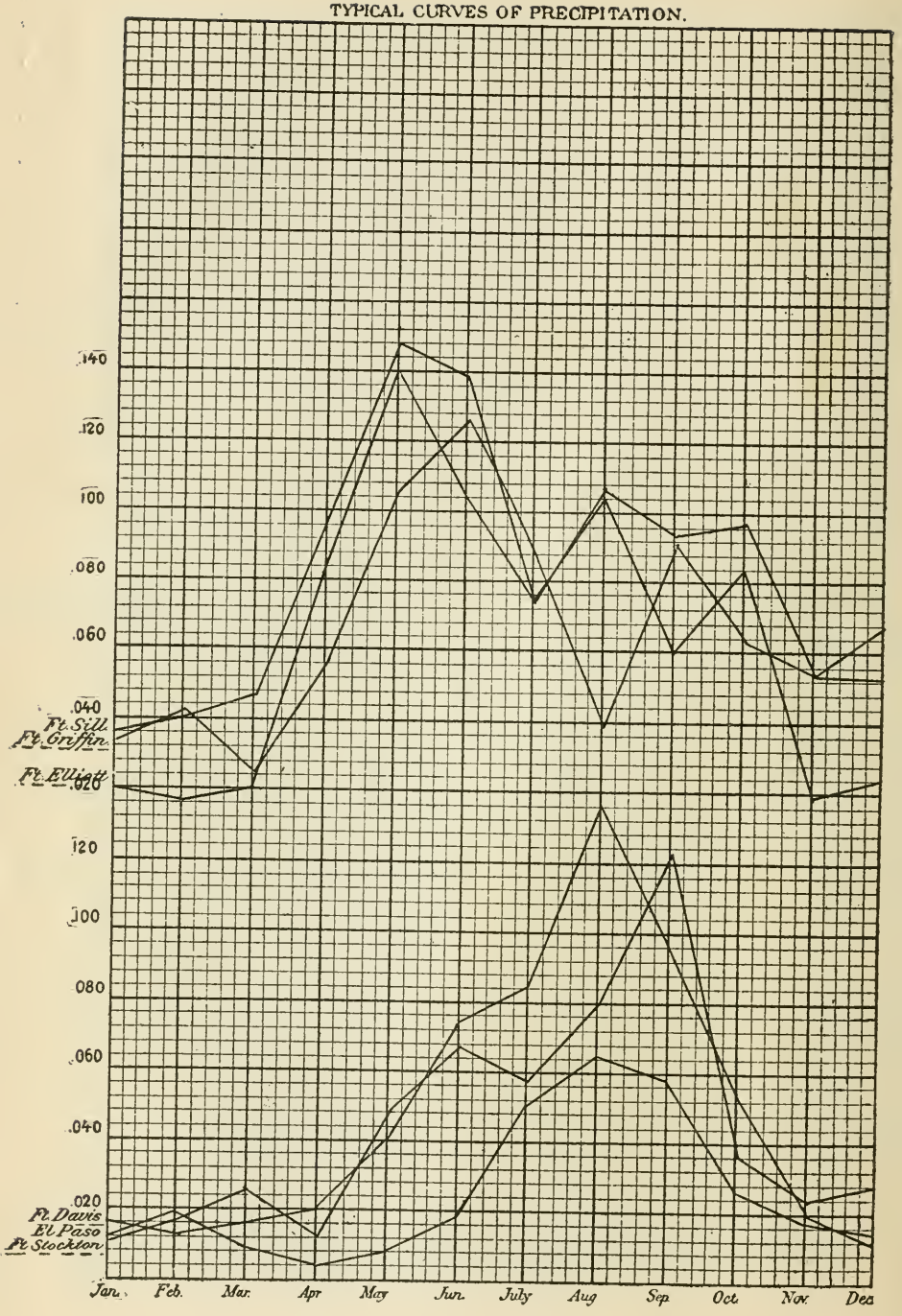

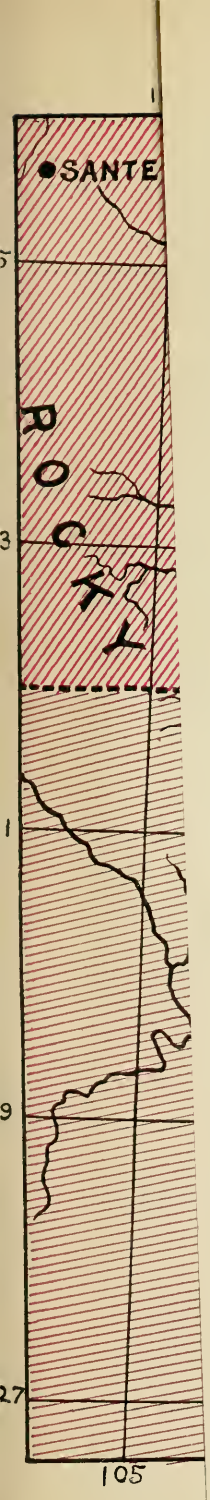

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OF CALIFORNIA

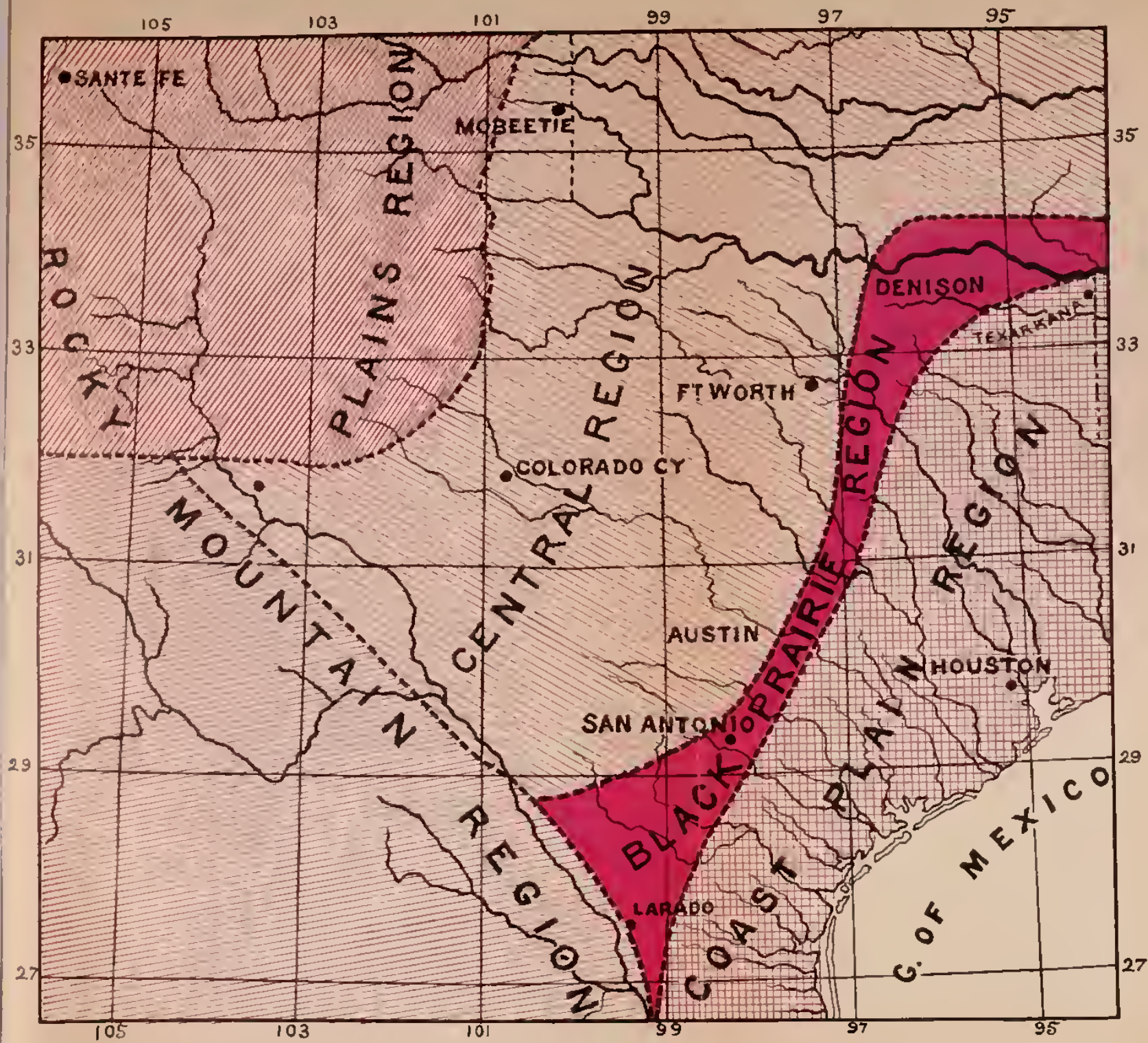


CHART IV.—GEOGRAPHICAL ZONES

THE AGRICULTURAL CONDITIONS AND RESOURCES OF TEXAS.

I.

DIVERSITY OF NATURAL PRODUCTS.

THE State of Texas comprehends a greater range of climatic and geologic conditions than can be found in any other State or group of States of equal area.

This diversity is due in part to its immense territorial expanse, and in part to specific geographical features from which result conditions of climate and soil peculiar to the State. The unusual variety of natural conditions is favorable to corresponding diversity of natural products, and exceptional productivity in specific classes results from the peculiar conditions noted. Texas is the only State where temperature, humidity and soil are equally suited to the distinctively Southern crops in conjunction with all the grains, fruits and forage plants of the more Northern States, and likewise to the prolific breeding of all kinds of farm animals.

II.

GENERAL PHYSICAL AND CLIMATIC CHARACTERISTICS.

IT is obvious, however, that the conditions noted above cannot prevail uniformly throughout a territory so vast as that of Texas, whose area exceeds that of all New England, together with New York, Pennsylvania, Ohio, Indiana, New Jersey and Delaware, and whose greatest extension is greater than the dis-

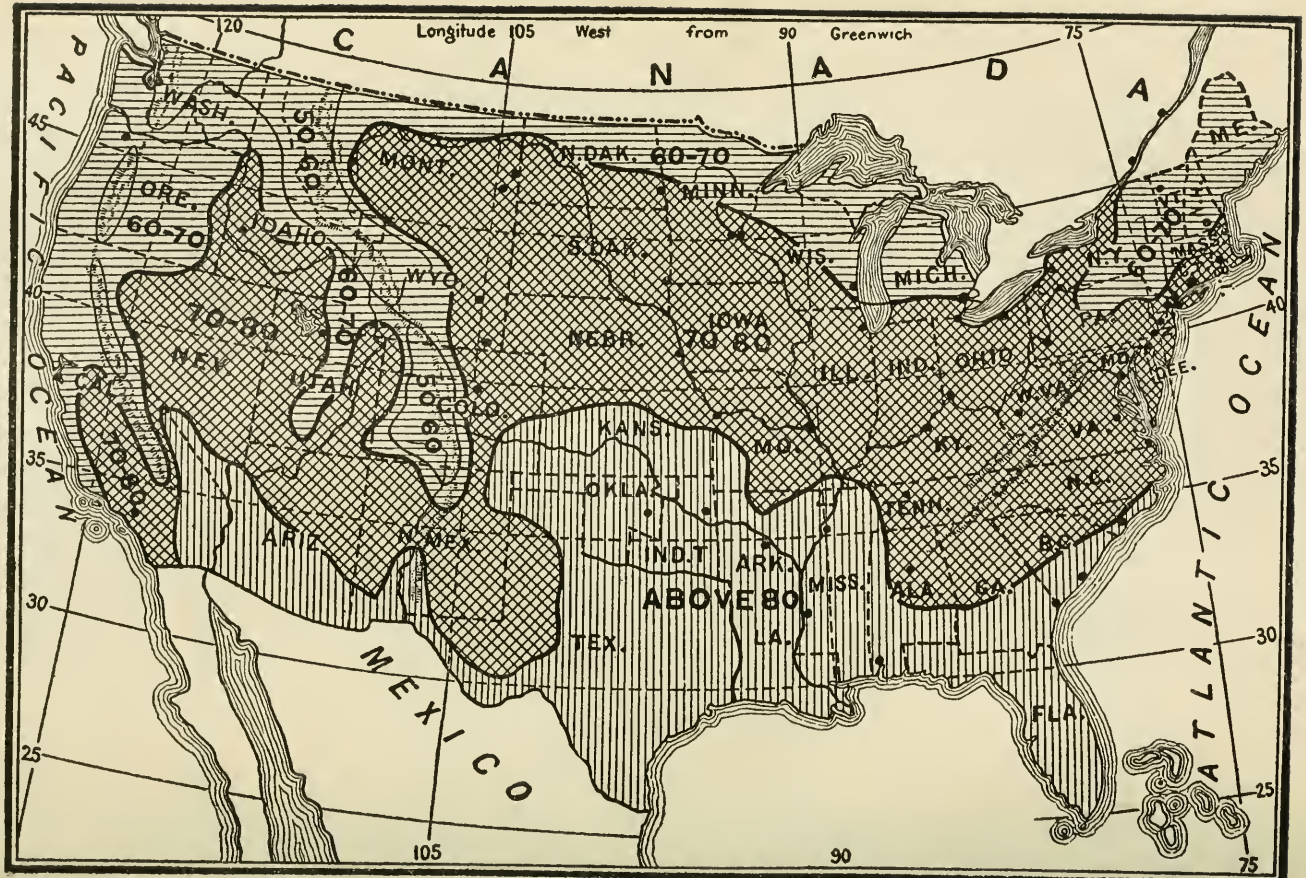


CHART V.—ISOTHERMAL ZONES OF UNITED STATES; JULY TEMPERATURE.

tance from Chicago to the sea. In effect the State may be divided into three climatic zones, trending in an approximately north and south direction, and each having distinct characteristics, due to marked and permanent differences in the degrees of humidity. These may be appropriately called the Agricultural and Timber Zone, the Pastoral Zone and the Arid Zone.

The first of these is of exceptional fertility and capacity to produce a great variety of crops, and has an abundance of useful timber of many varieties. The second zone is one of the finest pastoral regions in the world, but not so generally adapted for agriculture, except in limited areas here and there throughout its expanse. The third or arid zone is, as its title implies, almost rainless and treeless. It has great mineral riches, but it has little value for agricultural purposes, unless artificial irrigation is resorted to to supply the requisite moisture. Under irrigation the soil responds with marvelous fertility.

The area of the State of Texas is 265,780 square miles. The distance between its southernmost and northernmost limits is 740 miles; its extreme breadth east and west is 825 miles; its coast line upon the Gulf of Mexico is 400 miles.

The coast line is approximately a quarter circle, described from east to south. It is bordered by a concentric coastal plain from 100 to 250 miles wide, with a gentle slope from northwest to southeast, and a maximum altitude of about 500 feet. The immediate coast strip is newly deposited marsh land, bordered by forests east of the Colorado and by plains to the west and south of that river.

Adjoining the coastal plain is a roughly concentric zone, known as the "black prairie region," which describes an arc across the entire State from the Sabine and Red rivers in the northeast to the Rio Grande in the southwest. It is the product of erosion, the rich, black soil being fine detritus brought down by the rivers from the uplands and deposited as sediment in times of flood. Its outer limit is sharply defined, beginning at Denison on the Red River and passing near or through Sherman, Dallas, Waco, Austin and San Antonio, and thence westward to Eagle Pass on the Rio Grande. Its altitude is from 300 to 700 feet, its surface being disposed in the long, gentle undulations characteristic of prairie regions.

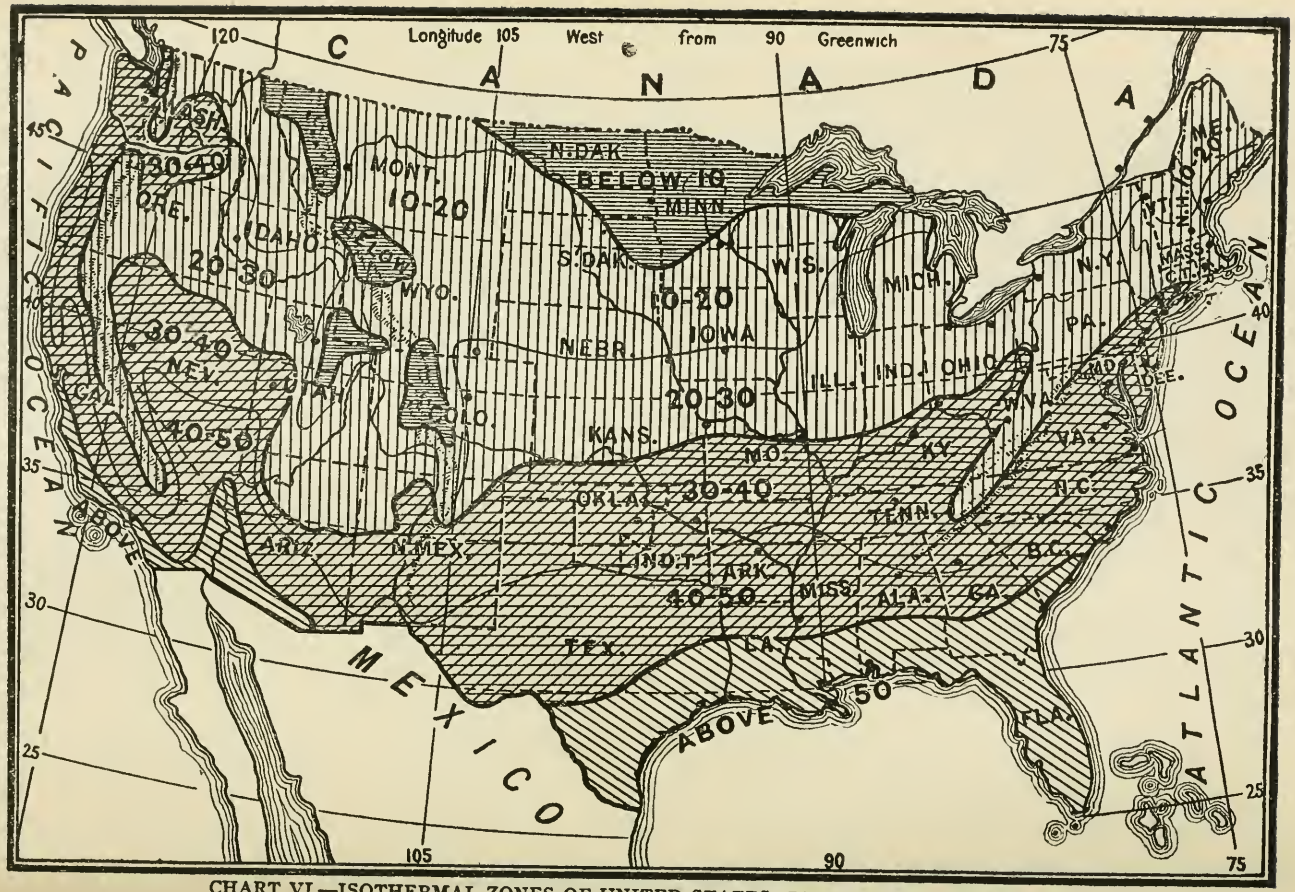


CHART VI.—ISOTHERMAL ZONES OF UNITED STATES; JANUARY TEMPERATURE.

Beyond the narrow black prairie zone extends the broad central region, a vast upland, once a table land, but now of greatly diversified surface, due to extensive erosion and the protrusion of non-eroded strata in the form of "dykes," buttes and rocky ridges. In the older river basins are rich alluvial prairies, in some cases 50 miles in width, bounded by fertile ridges partially covered with sparse forests. In other portions the geologic formation is unfavorable to plant life, the soil is arid and the vegetation scanty. In the middle part of this region is a rough semi-mountainous area, rich in minerals but destitute of fertility. The southwestern portion is a great rolling plain, wholly without streams, and therefore arid and incapable of sustaining either animal or vegetable life to any material degree. The surface of the central region is from 700 to 2,500 feet above sea level. Its northwestern boundary is marked by a precipitous escarpment or "fault," which forms a sheer cliff from 200 to 500 feet in height and several hundred miles long.

This great escarpment borders the "Llano Estacado," or Staked Plain, which fills the northwestern part of the State. It is the southernmost extension of the "great plains" which border the eastern slope of the Rocky Mountain range throughout its whole extent. The surface of the Staked Plain is smooth and wholly devoid of streams and forest growth. It is, however, capable of irrigation by means of wells and artificial reservoirs, and naturally produces a good growth of grass.

The Trans-Pecos region lies to the southwest of the Pecos River, between that river and the Rio Grande. It is a succession of mountain ranges, with wide intervening valleys, poorly watered and generally barren. It has very little capability for agriculture.

These several zones are co-terminous with distinctive geological formations, which form a series of shelves or "benches" descending in successive steps from the elevation of the great plains and the Trans-Pecos mountain ranges to the coastal plain and the sea level. The limits of each zone were originally marked by sharp escarpments or cliffs, falling on the margin nearest the Gulf to a lower level.

Across these successive benches and over these escarpments several great rivers have plowed their way in nearly parallel

courses from the slopes of the mountains in the northwest, southeastward to the Gulf of Mexico. In their upper courses they are in the nature of torrents, being dry for long periods and subject to sudden and extreme temporary freshets, whose great erosive action has carved deep canyons through the higher levels. The annual rainfall of these elevated regions is very small and concentrated within a brief period of time, alternating with long rainless periods, and therefore they are extremely arid and almost barren of plant life. The brief and infrequent torrential rains in consequence drain into the watercourses with great rapidity and descend into the lower valleys as torrents, heavily burdened with eroded soil, held in suspension and deposited as sediment upon the levels of the lower zones, where the rivers overflow their banks and cover the bottoms.

In the lower zones the rivers are more numerous, and although shorter are more constant in their flow and carry a larger annual volume of water than those rising in the higher zones. This difference is due to the greater humidity and more evenly distributed rainfall of the lower zones. In these zones, therefore, are found the combination of the exceptional conditions which make Texas pre-eminent in fertility and in variety of agricultural products—namely, a rich alluvial soil, abundant and constant humidity, and temperature whose variations are not extreme and whose mean is genial, equable and prevalent during a long period.

It is shown by the foregoing outline that while the eastern and central regions of Texas are extremely fertile and of very unusual agricultural capabilities, the favorable conditions steadily decrease with the increase of westerly longitude, and finally disappear entirely in a region characterized by tropical heat, aridity and barrenness.

This remarkable difference in climatic and physical conditions is caused by the mountain ranges to the west, whose lofty summits intercept the moisture-laden winds from the Pacific Ocean and condense their humidity into rain, which falls upon the western slopes of the mountains. The west winds, therefore, are moistureless after passing over the mountain ranges and supply neither rainfall nor dew to the regions to the east. From this cause arises abnormally high temperature by day and

rapid radiation of heat at night throughout a wide zone to the eastward, whereby the east winds are likewise deprived of most of their moisture at the eastern margin of the arid zone. Hence there is but little rainfall in the plains region eastward from the Rocky Mountains and their southern continuations, and the rivers flowing across them carry only the water from melting snows and from the rain that falls on the mountain tops.

In the eastern part of Texas the conditions are reversed. During a large portion of the year the southeast winds bear in suspension a heavy volume of moisture from the Gulf of Mexico. This is condensed by colder currents of air from the north and copious rainfall results. On the eastern border the annual rainfall reaches a maximum of sixty inches precipitation, which is exceeded in the United States only in a very limited area upon the Gulf coast and upon the border of the Pacific. At the western extremity of the State the annual rainfall decreases to ten inches, a quantity wholly insufficient for agriculture. This is the minimum rainfall east of the Rocky Mountains and the average precipitation at their eastern base from Mexico to Canada, whence the aridity of that entire plains region. Less than ten inches rainfall results in the absolutely desert regions to the west and northwest of Texas.

Although Texas comprehends almost the extremes of humidity and temperature to be found within the United States, their variations are relatively small. The temperature of the eastern zone is more uniform and the copious humidity more evenly distributed than ordinarily. The charts accompanying this article show the ranges and variation of humidity and temperature throughout the entire United States in isothermal and hygrometric zones; and the geology and meteorology of Texas are shown in detail by the several charts in this and other divisions of the Report. These exhibits show that the seasonal fluctuations of rainfall and temperature in Texas are below the average.

III.

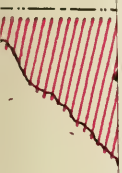
GEOLOGY AND SOILS.

POSSIBLY no characteristic except climate exercises so important an influence in shaping the future of a country as soil. In Texas, climate and soil have mapped out the wheat fields, cotton plantations, sugar belts, rice lands and forests of pine and of hard wood.

As the advantage to be gained by developing highly a restricted area of land in preference to partially cultivating a larger tract has been appreciated, improved methods of agriculture have been looked for. Careful studies have been made of weather, soils and crops. In order to give the subject proper attention there have been established colleges of agriculture, where experimental investigations are carried on and regular instruction given in the natural sciences. How far these efforts have been successful in elevating the subject of agriculture to a theoretical basis it is not necessary to inquire.

Certain it is that science has rendered great services to the practical understanding of the farmer. It is in consequence of this that the interest of the agriculturist causes him to want to know something of the supply and demand for staple crops and he asks for records of temperature and rainfall and for tables of analysis of manures and soils. To satisfy such demands the United States Government maintains a Department of Agriculture whose head supports the dignity of a Cabinet Office. Several States have agricultural experiment stations and from time to time issue bulletins which treat crop problems in a scientific manner.

It is, therefore, with the view of affording such few facts as have been accessible on the subject of the soils of Texas as relate more particularly to their durability, and physical and chemical properties, that the following remarks are made.



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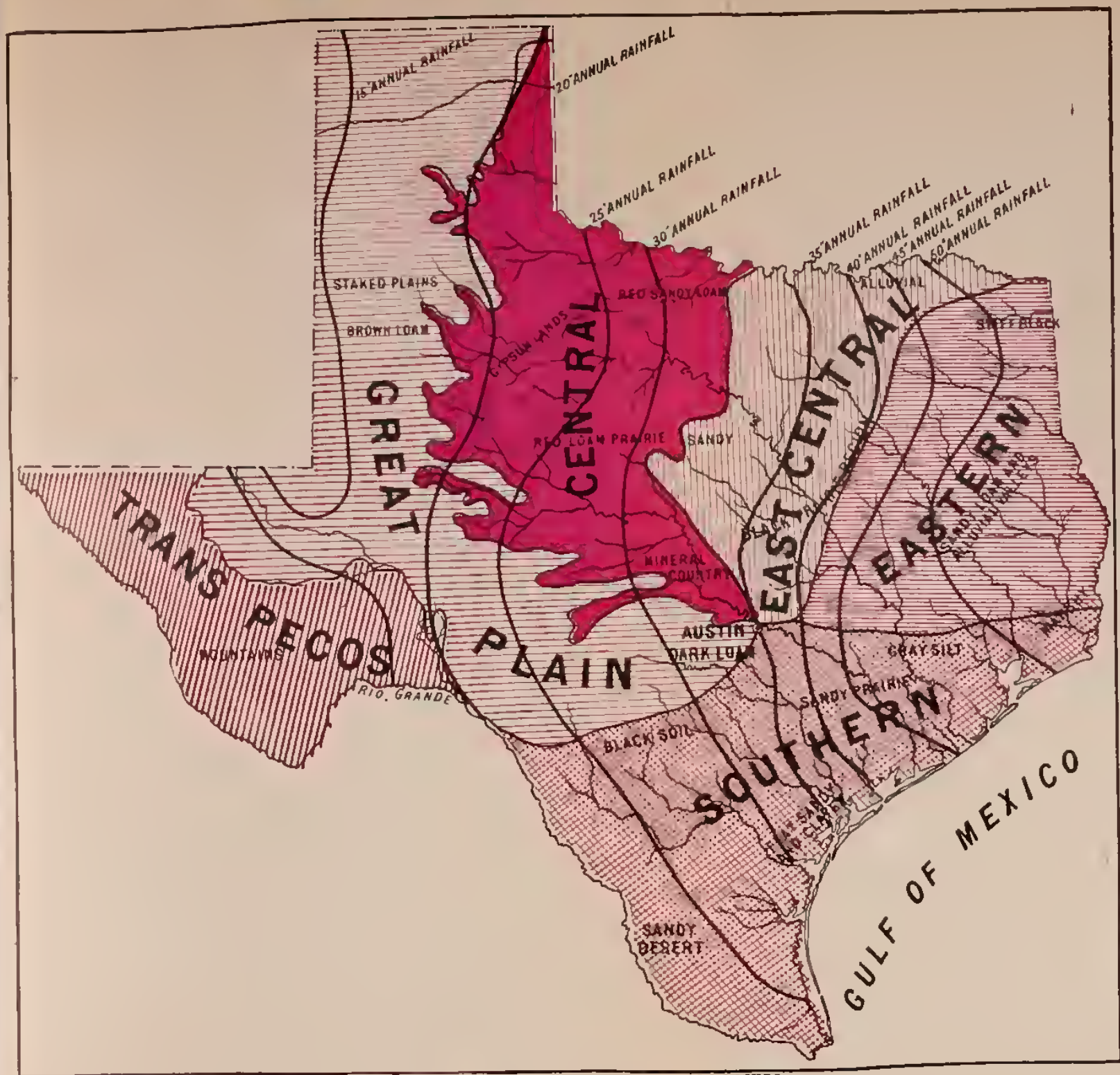

CHART VII.—SOILS AND ANNUAL RAINFALL IN INCHES

ORIGIN OF SOILS.

CONSIDERED from a scientific standpoint the origin of soils lies in the destruction of rocks, and their fertility is dependent upon the physical and chemical properties of such minerals as the rocks contain; decomposing vegetable and animal matter is also of consequence in a soil. In general terms it may be said that the value of a soil is dependent upon a fortunate mixture of these two classes of substances.

RESIDUAL AND TRANSPORTED SOILS.

IF a soil is found close to the site of the rocky formation from which it was derived it is called a residual soil. Residual soils are found in Texas on the plains and prairies and on high lands which are not subject to the overflow of rivers. If the parent rock is not near by, there is formed what is termed a transported soil. Transported soils are found in river bottoms and deltas, the famous alluvial lands of Texas rivers furnishing excellent examples.

RATE OF FORMATION OF SOILS.

THE formation of soils is a constant, although slow process, the rate varying greatly with the activity of the agencies which destroy the rocks and the resistance of the materials attacked. Granite and many of the most ancient rocks are nearly indestructible, while some limestones and other rocks of corresponding age appear to fairly rot away. This is well illustrated in Texas, where the soils which lie directly upon the older and more solid formations are poorly suited to agriculture, while those which have been derived from rocks of a more recent geological age have been often highly cultivated. The organic matter present in soils is commonly known as humus, and is attributable to the death and partial decay of plants; the changes which take place in it are largely due to the action of minute animals and bacteria. Humus is a source of nitrogen and aids in preserving moisture and heat in the ground. Mineral elements which are considered important to fertility and which result from the action of water and its con-

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tained impurities are lime, potash and phosphoric acid. Important elements which give to a soil characteristics of texture are silica and alumina. The former predominates in sandy soils, the latter is a mark of clay. Accompanying this notice there is a table of forty analyses of soils found in Texas.

PERMANENT FERTILITY.

THE solid and liquid constituents of soils required by plants are often slow in their formation. Different plants extract different chemicals, and in course of time elements which are constantly demanded may be withdrawn until the land becomes poor. Instances, however, of soils so rich in desirable elements that they never seem to be exhausted are found in several parts of Texas. The explanation of permanent fertility is to be looked for in two directions. The elements demanded by the plants are either renewed from above as by the overflows which are common in alluvial river bottoms, or they are replaced from below by the wearing away of the earthy structure upon which the soil is based.

To draw useful conclusions from the brief notice which can be here given to the soils of Texas, it will be desirable to consider what has just been said in connection with a few facts relative to the geology of the State.

GEOLOGICAL FORMATIONS.

MOST of the surface of the State of Texas is composed of soils the materials of which were deposited from water during remote ages when the present territory was covered by the sea. Fossil remains show that much of the land was formed in that period of the world's history marked as the closing part of the reign of reptiles and known to geologists as the cretaceous. The cretaceous formation in the United States extends along a great part of the Atlantic border as far back as New Mexico and Tennessee in the South; from the westerly margin it gradually tapers off to a point near Cape Cod. A leading feature of the cretaceous is the presence of chalk, marl and green sand, all of which form a very important element in contributing to the fertility of a soil. There are two divisions of

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CHART VIII.—GE

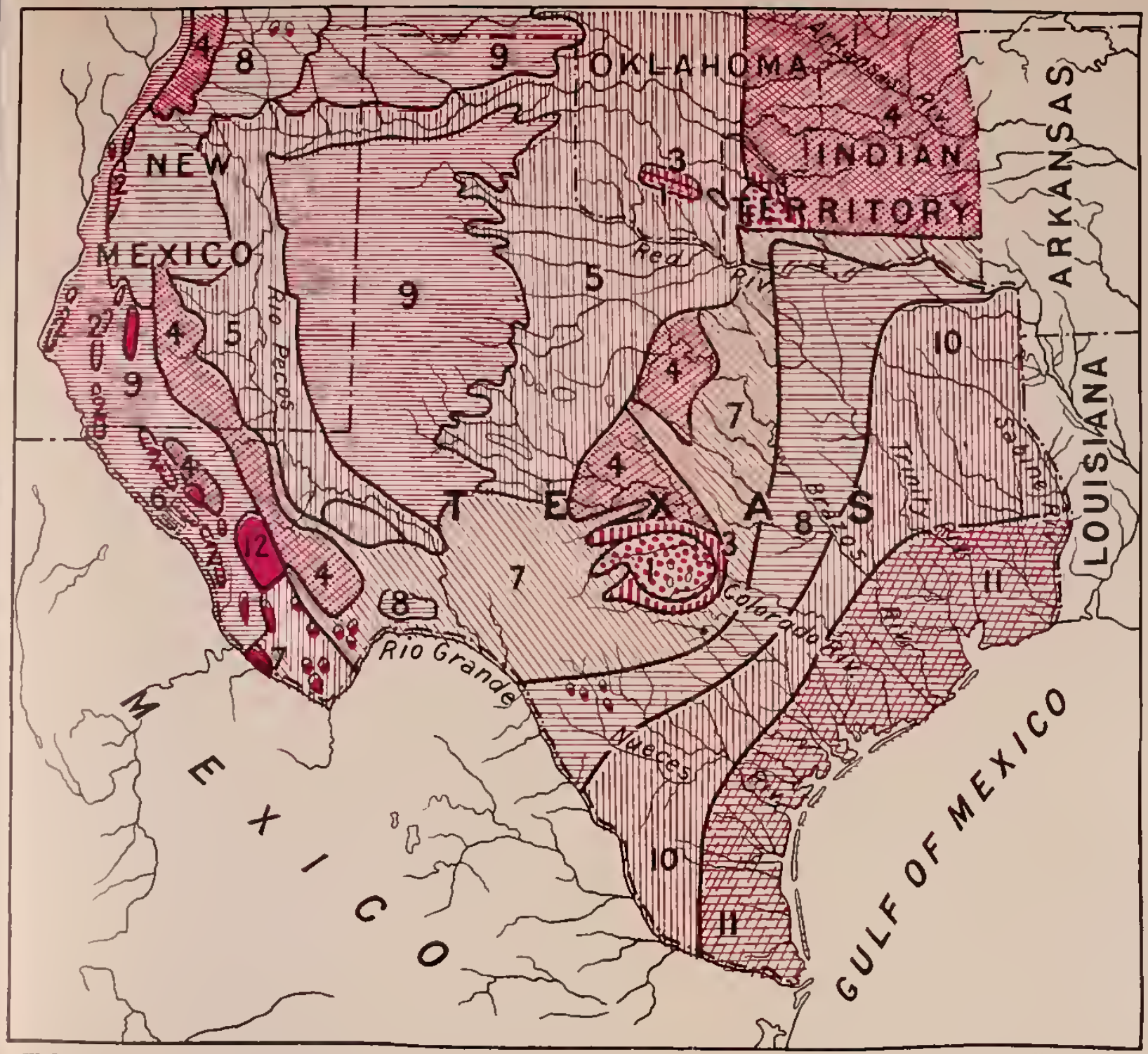

CHART VIII.—GEOLOGICAL FORMATION. 1, Older Granite; 2, Paleozoic and Mesozoic; 3, Cambrian and Silurian; 4, Carboniferous; 5, Permian; 6, Jurassic; 7, Lower Cretaceous; 8, Upper Cretaceous; 9, Non marine Tertiary; 10, Marine Eocene; 11, Coast Neocene; 12, Later Igneous.

this formation in Texas. The first is known as the Lower, or Older, and the second as the Upper or Newer Cretaceous. The Upper Cretaceous is by all means the more important from an agricultural standpoint. In Texas the Older Cretaceous consists of hard limestones, alternating with clays, often underlaid by sands. It is found in the Great Plain, Callahan Divide, the Lampasas and Cut Plain, all of which are in the central part of the State and in the region of the Trans-Pecos Mountains. The soils have not been cultivated as extensively as the soils known as the black lands.

THE BLACK PRAIRIE LAND.

THE Upper or Newer Cretaceous consists largely of soft calcareous materials that readily break up to form clay marls. The Upper Cretaceous is conspicuous in Texas, where it forms a large part of the best agricultural lands. The value of the soil is evidenced by the fact that it lies in that portion of the State which has the greatest rural population. The famous black soil region, which runs in a broad belt from San Antonio to the Red River, belongs to the Upper Cretaceous. It is rich in lime, dissolved alumina and silica. The color of the black soil is due to humus, which, as has been mentioned, is a condition highly favorable to fertility. The texture ranges from sandy to an extreme waxy or clayey consistency. The black lands vary in the matter of phosphoric acid. The greatest amount is found in the soils of the counties of McLennan, Falls and Lampasas. The least phosphoric acid is found in the sandy soils of Ellis and the waxy soil of Collin. There is a fair proportion of this important manurial ingredient in Van Zandt and Johnson counties. In a general way it may be said that potash is usually present in the black soils to a sufficient degree for fertility. In the counties of Collin, McLennan and Falls the potash content is very high, this soil being perhaps the best "Black Waxy" land in the State.

SOILS OF THE COAST AND EAST TEXAS.

BETWEEN the central agricultural region and the southern and eastern boundaries of the State there is a well-defined area of a younger geological age than the Cretaceous. It con-

sists of comparatively level layers of clay and sand of great depth and is known to geologists as the Tertiary. The older portion of this territory, which lies toward the east, supports a natural growth of hard woods, while the newer part in the south is largely given over to stock raising and small agriculture. Climate and the mineral qualities of the soils are adapted to agriculture, particularly in the lower portions of the eastern country and in much of the southern coast region, but much of the land suffers for want of proper drainage. In some districts the soils take on many of the characteristics of the black land and red soils to the north. Their texture varies from stiff, black loams to nearly pure clays and sands.

THE RED LANDS.

TO the northwest of the Cretaceous formation is an extensive country, which, from a geological standpoint, is much older. It extends from what is known as the Upper Cross Timbers to the Staked Plains and from the Canadian River Valley south to the Concho Country. This large tract is known to geologists as the Permian, and is commonly spoken of in Texas as the "red lands." Characteristics of the soil are heavy beds of clays underlaid by sandstones. Gypsum is found in deposits of varying proportions. The soils contain a large amount of potash and a fair percentage of lime and magnesia, but a low percentage of phosphoric acid. Iron gives the soil a red color, but it is not present in large proportions. Its even distribution is responsible for the marked hue which has given to this region its local name. Want of permanent fertility, partly due to a small content of organic matter and liability to drought, have caused the soil of this region to be somewhat neglected for agricultural purposes.

THE STAKED PLAINS.

THE Staked Plains belong to a similar geological age as the land bordering on the Gulf of Mexico and the soil was formed somewhat in the same way. Instead of having been covered by salt water, however, the high, level country of the Staked Plains once formed the bottom of a great inland lake

of fresh water. The soil of the Staked Plains is described as of the "Black Waxy" variety, with black sandy and red loam, to red sandy, as in the east central and central regions of Texas respectively. Small alkali lakes occur occasionally and there is a want of rainfall suitable for agriculture.

ALLUVIAL SOILS.

LANDS along the lower courses of the principal rivers of Texas are noted for their fertility. They contain alluvial soils, heavily charged with decomposing vegetable matters, which are laid down in successive layers at overflows. There is a resemblance between many of the bottom lands of Texas, and the alluvial bed of the Red River may be taken as the type. The channel through the Red River country along the red and black land districts is very narrow and contracted between high banks. A second river bottom, or channel, which is overflowed when the river is in flood, extends back from the middle course of the stream for a considerable distance, gradually widening as the river proceeds eastwardly. In the second bottom there is usually excellent agricultural land, as may be noted in the eastern part of Cook County, the soil of which is considered one of the richest in the State.

The lands along the Brazos River are very fertile and the most extensive alluvial country in Texas. The Colorado bottom as far as the black land region is narrow, after which it widens out to a broad, red, rich, silty bottom. The lower Rio Grande lands are sandy and black waxy and are said to be especially productive under irrigation. The Trinity, Navasota, Guadalupe and many smaller streams in the lower part of their course flow through country which is very rich with soils carried from a distance by the transporting power of their streams.

RESULTS OF ANALYSES OF FOR

From Chemical Data Collected by

SOURCE OF SAMPLE.	Moisture.	Volatile and Organic Matter.	Insoluble Matter and Sand
Brazos River Silt	3.26	2.69	70.92
Brazos Bottom, Harlem	1.17	1.544	84.31
Subsoil	2.26	2.91	79.50
Brazos Bottom, Chocolate Loam	3.04	3.00	78.59
Subsoil	3.28	2.50	77.57
Brazos Bottom, Peach Ridge	4.62	9.39	76.45
Subsoil	3.11	4.70	82.97
Kaufman Hammock	7.91	6.92	62.98
Subsoil	7.70	6.16	62.84
Kaufman County Timber Land	4.56	6.03	60.55
Subsoil	4.36	7.42	60.96
Kaufman Prairie Soil	7.57	11.06	56.50
Subsoil	6.78	10.96	56.40
Manor	8.47	7.26	50.69
Subsoil	8.23	7.18	51.17
New Braunsfels	7.22	4.96	61.99
Subsoil	7.34	2.24	51.07
Waxahachie	9.06	7.77	59.90
Subsoil	7.64	5.80	53.17
Pell County Black Waxy	2.42	7.34	44.23
Subsoil	1.94	2.65	48.17
Bell County Hammock	3.56	6.52	77.05
Subsoil	4.91	2.51	78.09
Pecan Gap Prairie	6.34	7.88	68 06
Subsoil	7.568	6.668	62.91
Terrell Prairie	2.09	6.84	85.96
Subsoil	2.09	3.81	87.95
Cherokee County, Rusk Valley Soil	1.32	4.60	83.22
Subsoil	1.02	3.31	85.91
Ridge Soil	.42	1.96	95 25
Subsoil	.30	.92	96.38
Pine Ridge	.80	2.05	96.21
Subsoil	.40	.73	97.76
Tyler County Creek Bottom	2.30	3.22	89.49
Subsoil	1.77	2.56	91.09
Tyler County Upland Soil	.37	1.18	97.58
Subsoil	.30	.67	98.17
Taylor County, Abilene	4.52	3 05	73.78
Subsoil	4.80	2.69	64 30
Wichita	1.62	3.01	88.46

TY SAMPLES OF TEXAS SOILS.

the Texas Agricultural Station.

Iron Oxide.	Alumina Oxide.	Calcium Oxide.	Magnesium Oxide.	Sulphuric Acid.	Phosphoric Acid.	Potash.	Soda.	Carbon Dioxide.
3.62	.558	5.66	1.85	.29	.34	.885	.224	4.00
2.36	3.87	2.74	.24	Trace	.166	.46	.37	2.24
2.91	5.87	2.01	.23	Trace	.26	1.24	1.25	1.58
2.80	6.05	1.66	.126	Trace	.136	1.091	.856	2.04
3.18	8.28	1.82	.18	Trace	.128	.841	.443	1.71
2.60	3.51	.609	.73	.079	Trace	.545	.32	.34
2.33	4.73	.424	.37	.134	.154	.482	.262	.28
2.86	7.35	6.30	.46	.147	.25	.68	.09	4.91
2.74	8.18	6.74	.297	.216	.499	.39	.20	4.48
2.42	4.53	11.00	.543	.127	.326	.316	.128	8.49
2.27	5.59	10.05	.64	.16	.266	.419	.185	7.78
2.82	7.04	6.62	.81	.151	.313	.837	.052	6.26
2.78	2.38	7.35	.615	.137	.294	.606	.109	6.06
3.73	16.35	5.81	.317	.082	.115	.576	.151	5.84
4.74	14.33	6.96	.507	.147	.119	.604	.095	6.11
4.03	5.62	7.32	1.31	.30	.41	.22	.13	5.80
4.15	5.76	14.66	.96	.17	.51	.47	.12	11.52
5.44	6.81	5.17	.67	.14	.15	.35	.04	3.98
5.18	6.32	10.62	1.41	.29	.65	.41	.24	8.11
1.58		23.98	.94	.15	.12	.22	.25	18.00
2.68		23.60	1.13	.21	.13	.28	.30	18.35
2.66	4.91	1.03	.73	.02	.18	1.45	.96	.81
3.98	7.74	.83	.90	.02	.17	1.07	.33	.65
4.23	9.48	.814	.32	.236	.128	.83	.636	.344
4.19	10.36	.305	.34	.12	.179	1.29	.60	2.32
1.08	1.68	.55	.28	.24	.28	.17	.07	....
1.45	2.71	.37	.32	.11	.23	(27)		....
5.82	2.11	.555	.126	....	.243	.48	.40	.44
6.44	1.71	.255	.197	....	.141	.442	.486	.187
1.22	.69	.16	Trace	Trace	.07	Trace	Trace	....
1.18	.66	Trace	.18	.10	.15	Trace	Trace	....
.776	....	....	....	Trace	Trace	Trace	Trace	.34
.93	.009	....	....	Trace	Trace	Trace	Trace	.21
3.94		.44	.08	Trace	.03	.06	.07	....
4.12		.36	.15	Trace	.03	.12	.16	....
.75		....	.08	Trace	Trace	Trace	Trace	....
.78		....	....	Trace	Trace	Trace	Trace	....
1.78	6.51	4.04	1.41	.154	Trace	1.14	.96	2.25
2.23	5.06	9.33	5.20	1.10	4.23	.102	.588	.305
2.06	3.82	.07	Trace	.06	Trace	.426	.139	....

IV.

THE STAPLE AGRICULTURAL AND PASTORAL PRODUCTS AND THEIR RANGES.

THE staple field crops of Texas comprise cotton, sugar, tobacco and rice, in the class which, to thrive, requires comparatively high temperature, long seasons and plentiful humidity. In the cereal class corn is an important crop of large productivity. Oats, wheat, rye and barley thrive in large areas, while the variety of highly nutritious grasses is great and their growth luxuriant. As a producer of cattle, hogs, sheep, mules and horses, the State stands in the first rank. Garden and orchard products in great variety find the soil and climate congenial.

The areas within which the successful cultivation of the staple crops has been already well developed are indicated upon the several charts herewith, which also show their relative productivity in comparison with that of other parts of the United States. In the case of the various cereals these charts are based upon the actual product in bushels per cultivated acre. It should be pointed out that while the maximum potential product has been reached in the Northern grain States by skilful cultivation, Southern farmers have had comparatively little experience in grain growing and in improved methods; whereby their actual product is much less than the potential product possible under the best methods, when applied to the favorable conditions of soil and climate found in Texas. Wheat growing has, however, increased very rapidly in Texas, and it now ranks among the greatest wheat-producing States.

A statistical exhibit of acreage and bushels is, therefore, of little value as an indication of the grain-raising capacity of Texas; for which reason such statistics are omitted. On the other hand, exact and ample information is indispensable as to soils, humidity, rainfall, temperature and their seasonal variations, and natural irrigation afforded by water courses. Some of these important subjects have been separately treated in detail in the special reports on "Health Conditions and Climate" and

"Water Supplies," by Dr. George A. Soper, Ph.D., which are included elsewhere in this volume; for which reason only general reference to those subjects is here necessary. Dr. Soper's admirable monographs are accepted as the basis for this article, as to climate and water supply; and the reader is referred to Dr. Soper's parallel discussion of the subject. While the physical conditions of a large part of Texas favor a very large yield of corn, a high average yield of wheat and oats and a good average yield of the minor grains, the economic conditions are peculiarly favorable to the profitable cultivation of food products. The natural conditions must eventually induce a large manufacturing and trading population; and cotton raising and stock raising must continue to absorb vast areas. Thus, on the one hand, the grain and other food products of the field will be restricted by the use of land for cotton and grazing; and, on the other hand, a relatively large food-buying population will consume the grain product of nearby fields at prices very profitable to the producer, because the selling price is not largely consumed by the cost of delivery, as is the case with the surplus grain products of the Northwest when they are forced to seek a market in Europe.

To state the case tersely, Texas will eventually be able to consume its own grain and garden product, while it is unlikely that any of the Northern prairie States ever will.

The reasons are found in the collocation of mineral deposits, sufficient fuel, and oil reservoirs; the incentive to cotton manufacturing offered by the fact that the peculiar fibre of Texas or Arkansas cotton is essential to great development in that industry, and that Texas can produce a greater variety of food supplies at less cost than almost any other State. The conditions recited tend strongly to induce manufacturing growth and make agriculture profitable.

Although cotton is by far the most important agricultural product of the State, its relation to prosperous development may be concisely stated. Texas, in common with nearly all the other cotton States, has grown cotton excessively, and greatly neglected other field products, for which there has been a less obvious and reliable market. As a rule the cotton acreage has been great, and in years of large production the great surplus has sought distant markets at small and profitless prices. The growing tendency

is toward diversity of crops—less cotton and more grain and other food products. Less acreage, less surplus, more domestic consumption, less export and better prices sum up the outlook for Texas cotton growing. Texas now annually plants about six and a half to seven million acres in cotton and produces from two and a half to three and a half million bales—more than one-quarter of the product of the entire United States.

The sugar production of Texas is comparatively unimportant, although it stands second in the rank of sugar-growing States. The principal sites of its cultivation are the lower bottom lands of the Brazos and Colorado rivers. The production of tobacco is likewise unimportant. Rice growing is a pursuit which has been little developed in Texas, although the conditions are peculiarly favorable to it. Vast areas throughout the lower coastal plain are admirably suited for its highly successful cultivation by reason of continuous and abundant ground moisture, constantly humid atmosphere, and proper temperature during a long season. The actual rice product is small, but in the opinion of competent judges rice culture is a potential industry, worthy to rank among the most valuable agricultural resources of Texas.

The production of textile fibres is also a potential resource deserving consideration. The ramie plant is extremely prolific in Texas; when the commercial use of ramie fibre becomes practicable through economical decortication, which has not yet been achieved, the growing of ramie will become an important industry. The natural conditions are equally favorable to jute culture. Experiment has shown that the fibre-bearing animals other than the sheep can be successfully acclimated in Texas. The Angora goat, which supplies the long, silky fibre commercially called mohair, thrives well.

As a pastoral State Texas stands among the foremost. Its vast upland areas, though unfitted for cultivation by lack of streams and rain, produce a great variety of nutritious grasses, which afford excellent pasturage for cattle and sheep. The luxuriant growth of the forage plants appears from the fact that the tonnage of hay per acre is greater than in any other State in which hay is an important product. Hence the cattle product of the State exceeds that of any other; and in sheep it is only exceeded by Ohio.

The conditions are likewise very favorable to the breeding

of horses and mules; while the abundant corn product has made the State one of the chief producers of hogs.

There are numerous varieties of food plants, fruits, etc., peculiar to local areas. These are discussed in the following divisions, wherein the distribution of farm, orchard, garden and dairy products by local districts is also set forth. Local conditions of soil, water supply and similar matters are likewise explained in sufficient detail.

V.

CLIMATE, SOIL AND PRODUCTS OF LOCAL DIVISIONS.

DISTINCTIVE climatic and physical conditions delimit the territory of the State into at least nine well-defined areas, characterized by obviously different features, determined by latitude, altitude, rainfall, soil and proximity to the ocean. They are:

1. The Coastal Plain.
2. The Eastern Texas Forest Region.
3. The Red River Valley.
4. The Black-Land Prairies.
5. The Lower Rio Grande and Nueces Region.
6. The Chocolate-Soil Plains Region.
7. The Staked Plains.
8. The Irrigable Pecos and Rio Grande Valleys.
9. The Trans-Pecos Arid Lands.

1. *THE COASTAL PLAIN.*

THIS title is here used in a restricted sense to denote only the purely alluvial portion of the true (or geological) coastal plain; that is to say, the almost level lands immediately bordering or adjacent to the coast, wholly formed by the sedimentary deposits brought down by the rivers and dropped upon the ocean floor to gradually form new land. This alluvial, or lower coast plain, which corresponds to the bottom lands of a river extends from the Sabine River on the northeast, to the Rio Grande on the southwest, varying in width from seventy miles in the southwest, to over one hundred miles in the north-

eastern parts, and rising gradually from the low, sandy beach of the Gulf of Mexico to 250 feet altitude along its northwestern boundary. Its latitude ranges from 26 degrees on the Rio Grande to 31 degrees on the Sabine.

The average annual rainfall varies from sixty or more inches in its northeastern parts to twenty or thirty inches in the southwest.

The entire belt is perpetually fanned by the Gulf breeze, which causes a remarkably equable temperature whose extremes show an annual variation of but about 30 degrees. The temperature is seldom more than 80 degrees Fahrenheit, in the shade, in summer, and in winter falls below 50 degrees only on the rare occasions when the great blizzards known as "Northers" sweep down from the north. During these furious storms the cold becomes intense, the temperature commonly falling to 15 or 10 degrees, and in very rare instances to zero. The Northers are, however, of rare occurrence and short duration.

The soil is generally black, more or less sandy, rich; in places alkaline, when it is underlaid by a "hard-pan," yet such become productive by drainage and cultivation. The general surface of the country is very flat, especially the eastern parts, yet pretty well drained, especially in the vicinity of the numerous bayous and creeks coursing through it to the rivers and Gulf. Along these streams and the river bottoms, which latter are low, wide and exceedingly rich, there is heavy timber, consisting of numerous species of trees. In Brazoria and adjoining counties are large bodies of great live-oaks. Away from the streams the country is mostly prairie, covered with luxurious grass, on which many large herds of cattle feed, where not in cultivation in other crops.

Cotton and corn are the leading products, but on the river and creek bottoms, especially in the central and eastern parts, ribbon-cane and rice are grown extensively and yield great harvests, and are very profitable. The lands within ten to fifteen or twenty miles of the Gulf, are generally very favorable to the growing of winter vegetables, such as cabbage, celery, spinach, lettuce, radishes, turnips, cauliflower, asparagus and

onions; and also to strawberries, which ripen in February, March and April. Early tomatoes, potatoes, beans, etc., are produced in large quantities, for the Northern cities as well as for the home markets, the chief being Houston and Galveston.

Large plantations of figs for canning are being made, as the crop is very large, certain, easily handled in that form, and very profitable. Some varieties of pears, plums and peaches have proven profitable on the higher, better-drained portions of the region. Melons grow on the more sandy, well-drained lands of the coast country, and, shipped in car- and train-loads to numerous Northern cities, have proven very profitable, as no competition west of the Mississippi River comes against them. The ornamental varieties of trees, shrubs, perennials, etc., for decoration of home grounds, parks and cemeteries, are very numerous and luxuriant. Bermuda grass is the variety principally in use for lawns, for which purpose it is most effective and satisfactory. For pasturage it is most prolific per acre, better relished, and endures more drought and tramping by stock than any other known. All the bays, inlets, bayous, creeks and rivers of this region are abundantly supplied with numerous species of fine food fish and water-fowl.

2. *THE EASTERN TEXAS FOREST REGION.*

THIS region extends northward from the eastern end of the coastal plain, between the Sabine and Navasota Rivers, to the Red River, a distance of nearly 300 miles from latitude 30 degrees to nearly 34 degrees. Its extreme width is about 150 miles, narrowing somewhat from south to north. Its altitude rises from 250 feet in its southern part to about 600 or 700 feet in its central parts about Nacogdoches, Palestine, Jacksonville, Tyler and Gilmer.

On the uplands the surface soil is everywhere of sandy texture, light red or gray, on red or yellow clay subsoil. In the southern parts the surface exposure is of the Tertiary formation, in the northern parts of the Cretaceous. In the latter, as at Nacogdoches, are rich marl-beds highly valuable as a source of fertilizers excellently adapted for use in the sandy soils. Good bodies of lignite coal, of good steam-producing

quality, are found, as at Timpson, in Shelby County, where mines are worked to considerable extent. Excellent and abundant iron ores are found in several counties, and are worked quite extensively at Rusk, in Cherokee County.

Great abundance of pure, soft water is reached in wells at ten to fifty feet, and there are numerous perennial springs, creeks and rivers.

The prevailing feature of the country is stately forest growth. Vast forests of fine lumber pines of three different species cover the uplands in the southern parts, except where cut out by the millmen, and put into cultivation by the farmers. Skirting the streams are many species of oak, elm, maple, gum, poplar, hickory, walnut, magnolia, holly, etc. Numerous species of beautiful flowering shrubs and perennials, identical or allied with those of the Carolinas and Georgia, grow profusely among the rich undergrowth of the forests.

The rainfall averages about fifty inches.

The fierce blizzards that in winter strike the great prairie regions of Northwestern Texas make little impression in the forest region. The climate is very mild, zero temperature rarely occurring, few winters having lower temperature at any time than 20 degrees above zero. Cape jessamines, figs and pomegranates endure the winters uninjured, and tea roses continue to bloom through the holidays. All the fruits of Georgia thrive well here, and at a few places, among them Jacksonville, Longview, Troupe and Tyler, the fruit and garden truck interests have grown in recent years to large proportions, so that carloads and even trainloads of melons, strawberries and peaches are shipped to the North in their season.

In the southern parts ribbon cane and rice thrive on bottom lands, and cotton grows luxuriantly everywhere except upon the very thin, sandy lands, which likewise yield well, with fertilizers and good culture. The red soils produce fair corn, wheat and rye, but the region cannot compete in grains and grasses with the black lands farther west. Hence it is not so well adapted to the production of beef and pork. It is, however, excellently suited to dairy products, by reason of the native

and Bermuda grasses and sorghum, with plenty of good shade and water. Fine lands are yet very cheap in almost all parts of East Texas. The lumber interests have been the chief objects of development, yet there is probably no other part of the State in which various industries could be more readily or profitably developed.

3. *THE RED RIVER VALLEY.*

THIS region extends from the northern end of the East Texas forest region, 250 miles westward to Wichita County, averaging some ten miles in width from the river on either side. Its soil is for the most part similar to the sandy, timbered soils of East Texas, with many little prairies of black sandy soils interspersed. The altitude varies from 300 feet about Texarkana to 1,000 feet in Wichita County. Denison, in Grayson County, has an altitude of between 750 and 800 feet. The drainage everywhere, even in the river bottoms, is excellent, and the climate mild and salubrious, except that in the heavily timbered bottoms it is malarious until cleared and cultivated, when it becomes healthful.

The varieties of trees are not so numerous as in East Texas, the pines, white oaks, gums, chinquapins and some others being absent in the parts west of Red River County. The valley can grow all that East Texas can, except rice, ribbon cane and some tender shrubs. It is more prolific in apples and grapes, and in those fruits it quite equals northwest Arkansas and southern Missouri. The beautiful bluffs and small tablelands on the Texas side of the Red River are highly adapted to fruit and vegetable growing on account of the congeniality and variety of soils and aspects and the peculiar immunity from late frosts in spring. A total failure of the peach crop on the Texas side of the river has not occurred in the past twenty-five years. The bottom lands of the Red River, which are quite wide, are as fine as any in the world, two bales of cotton per acre often being made.

This mild and splendid productive fruit belt is sandwiched between the extensive "Black Waxy" lands on either side, the

finest grass, grain and cotton lands (except the Red River bottom) in the southwest. Contiguous to it are large coal areas yielding coal of excellent quality. It has abundance of fine timber and pure, soft well water, plenty of excellent building stone, brick clay, hydraulic cement materials of best grade and other great natural resources. These make this region capable of supporting a dense population, which it is rapidly acquiring, and its agricultural opportunities are, therefore, excellent. The prosperity and growth of the cities of Paris, Bonham, Sherman, Gainesville, Henrietta, Wichita Falls and Denison on the Texas side and Durant and Ardmore on the territory side, ranging in population from 4,000 to 20,000, testify plainer than words to the advantages of this region.

4. *THE BLACK LAND PRAIRIES.*

THIS region extends from the northern end of the East Texas forest region, 250 miles westward to Wichita County, tending from the Coastal Plain on the south to the Red River Valley and eastward to the ninety-ninth meridian.

It is crossed from north to south in its western parts by two sandy land timber belts, known as the Lower (eastern) and Upper Cross Timbers, which merge into the Red River Valley near its western end and have very similar soils and adaptabilities, with a dryer and less equable climate. They are very broken and irregular in outline.

Coursing through the Black Lands from northwest to southeast are the headwaters of the Sulphur, Sabine and Trinity in the northern parts, and the middle parts of the fine rivers, Brazos, Colorado, Guadalupe and San Antonio, all with numerous tributaries. Along all of these streams a great variety of timber and undergrowth is found, and the streams usually are bordered with soils finely adapted to fruit and truck growing.

All the uplands between the streams of this region, except the Cross Timbers, the hilly country bordering the Colorado in several counties northwest of Austin and the sandy timbered belt in its southern parts, mentioned later, are beautiful, gently rolling, black land prairies. Those east of the Lower Cross Timbers are of an intensely black, sticky, nature, and hence are

known as "The Black Waxy" lands. These soils are generally very deep and inexhaustibly rich, lying upon white, chalky lime rock or clay foundations, in which "hard water" is generally obtained in wells and springs, but occasionally good "soft water" is found in local gravel and sand beds.

Excellent artesian water is generally reached at 300 to 600 feet in the western parts, as at Fort Worth, and at greater depths to the east and south. These waters are found in two different strata of coarse sand, the upper taking its name from the town of Paluxy in Hood County, where it outcrops, and the lower from Trinity River, on the headwaters of which, in the Upper Cross Timbers, in Montague, Jack, Palo Pinto and Eastland counties it outcrops. A great "fault" in the earth trending from Del Rio on the Rio Grande, through San Antonio, New Braunfels, San Marcos, Austin, Waco, with the down-throw on the southeast side of the "fault," allows great volumes of this artesian water to escape at various points, as at the places just named, even to the extent of driving large mills and factories, as at New Braunfels, where are located large flouring mills and woolen factories.

Extending through the Black Lands from northeast to southwest, along and mostly on the south side of the International and Great Northern Railway, is a long arm of sandy timbered land, similar to the Cross Timbers, some 10 to 20 miles in width, extending from the East Texas Forest Region, as a prolongation of it, far to the southwest, passing San Antonio on the southeast. The timber, however, is very inferior to that of East Texas, yet it furnishes the much-needed wood for the great prairies bordering it. This is a fine fruit-belt like the similar lands of the State.

The Black Lands lying south of this long arm of sandy land and bordering directly on the Coastal Plain are flatter, somewhat sandy, underlaid generally with a "hard pan" of "joint clay," and unless drained and subsoiled are less productive than the "Black Waxy" lands. They are known as "Mesquite Lands," being thinly set with mesquite trees. The Black Lands lying between and westward from the Cross Timbers are more or less sandy, more rolling, easier to work and less drought resist-

ing than the "Black Waxy" lands. Grazing is more extensive on these and the "Mesquite Lands" and cotton and grain production less extensive than on the "Black Waxy."

In the hilly region of the southwestern part of the Black Lands Region, especially in Llano County, are found inexhaustible quantities of excellent magnetite iron ore and fine building stones, such as granite, marble, etc. In the far southwestern corner of this remarkable region (in Waldo County) are great deposits of snow-white kaolin of a quality pronounced by experts suitable for making the finest grades of porcelain.

The greatest length of the Black Lands Region from northeast to southwest is over 400 miles, and the greatest width over 200 miles. A glance at a recent railway map of Texas will show a dense network of railways upon the Black Lands. This tells more forcibly than words of the immense haulage supplied by the agricultural products of this region. Cotton, corn, wheat, oats, hay, cattle, hogs, horses, mules, sheep, goats, cottonseed oil, meal, petroleum (at Corsicana), lime, building stones, coal (in Eastland, Stephens, Young and other counties), fruits and vegetables are rapidly making the Black Lands Region very wealthy, as evidenced in the fine cities of San Antonio, Austin, Waco, Corsicana, Ennis, Temple, Hillsboro, Fort Worth, Dallas, Terrell, Greenville, McKinney, Denton and the Red River Valley cities heretofore mentioned, which draw much of their support from this region, as well as from the valley and Indian Territory.

The Black Lands Region varies in altitude from 250 feet in the southeastern parts to 700 in the northern, 1,000 to 1,500 in the western and even to 2,000 feet in the hilly, mineral region, of which Llano County is the center.

The average rainfall varies from 50 inches in the eastern parts to 25 to 30 in the western. The rains fall mostly in May and June, when most needed.

The region is everywhere healthful, and the constant breezes from the Gulf in summer greatly moderate the heat, which would otherwise be oppressive. The winters, with the exception of an occasional blizzard, running down toward zero in the northern parts, are mild, and without much rain.†

5. *THE NUECES RIVER REGION.*

THIS region is a triangle, the apex of which is San Antonio, and the base the Rio Grande, from about Eagle Pass, in Maverick County, to about Rio Grande City, in Starr County. The triangle thus described embraces the major part of the upper Nueces Basin. Its longest side, resting on the Rio Grande, is about 200 miles in length, and each of the other sides is somewhat more than 150 miles long.

Its altitude is from 250 feet on the east to 1,000 feet or more along its northern boundary, which pretty well coincides with the "fault" heretofore mentioned, in connection with the artesian waters of the Black Lands.

The rainfall varies from 30 inches on the east to 15 inches on the west. It is semi-arid and semi-tropical, yet with too sudden and severe changes to allow the growth of oranges in open ground. The latitude in the extreme south on the Rio Grande is 26 degrees and the northern boundary 29½ degrees. Although the sun shines powerfully from almost cloudless skies, the perpetual breeze from the Gulf greatly modifies the heat. Figs and European grapes succeed well everywhere in this region, especially with irrigation, which is applied to some extent from the big artesian springs, which supply enough water for thousands more acres. More extensive irrigation, however, is carried on along the Rio Grande, as at Del Rio, Eagle Pass and Laredo.

The grape crop matures here in June—long before it ripens elsewhere, except in southern Florida—and the expense of reaching the great northern markets is small in comparison with that from California. By grafting the finer varieties of Vinifera upon resistant roots they can be perpetually grown in the Nueces Region to equal, if not excel, those grown in California; and the industry of viticulture can be very extensively and profitably developed.

The large, fine Italian onions are considerably grown near Laredo, San Antonio and other places, with large profits.

The main occupation, at present, of the scattered population of this region is cattle ranching, *a la Mexicano,* and it is exclusively tributary to San Antonio. The surface of the country is

generally quite level and covered with a low, scattered, thorny growth of shrubs, with good grazing. Shrubby timber fringes all the streams, of which nearly all are tributaries of the Nueces River, famous for its pecans, from which the stream derives its name, Nueces (Spanish) meaning nuts. The soils are variable, some being dark waxy, some sandy and some chocolate.

In this region the cutting ant is numerous. It is a medium-sized, large-headed species, and burrows extensively, sometimes their mounds being fifty feet or more in diameter and two or three feet high, all chambered. The ants sally forth only in the night in armies under leaders, and defoliate trees, shrubs and vines, carrying the sections of leaves in their mandibles into their burrows for food. They are readily exterminated by pouring liquid bisulphide of carbon into their burrows and stopping the openings.

In this region nearly every one speaks both English and Spanish, preferably the latter, as a large element of the old settlers and their descendants are of Mexican origin.

Lands are cheap. By buying large tracts and colonizing them with industrious French, Germans and Americans the grape industry may become an important branch of agriculture, as the lands are rich, the climate healthful and the markets of the best when the grapes are shipped to the larger Texas and northern cities.

6. *THE CHOCOLATE PLAINS.*

THESE adjoin the Black Lands on the west and north, and extend from the Pecos River on the southwest, northwardly through all the central part of the State (usually known as "Western Texas"), up through the eastern half of the "Texas Panhandle," into Oklahoma and Western Kansas.

The altitude varies from 1,500 feet in the south (along the line of faultage heretofore mentioned, the north side of which is several hundred feet higher than the south side), and east; to 2,500 feet in the northwest, adjoining the "Staked Plains."

The surface is undulating prairie on uplands, with low, thorny, scattered shrubs and cacti in southern parts and mesquite in all

parts. The soil generally is reddish-brown in color, very fine in texture, easily powdering and becoming dusty and drifting with the wind in exposed cultivated lands, but packing into smooth, fine roads under travel. It is very rich in elements suitable for vegetable growth, when supplied with water.

The rainfall varies from thirty inches in the eastern parts to about ten or fifteen inches in the western. Constant, gentle winds, chiefly from the southeast and south, quickly carry off the moisture, and hence the semi-arid character of the climate.

These plains are drained by the headwaters of the Devil's, Nueces, San Antonio and Guadalupe Rivers on the south, the Colorado and Brazos in the center and the Red and Canadian Rivers in the northern parts.

Along all these streams are timber fringes, chiefly of elm, ash, hackberry and cottonwood. The short but very nutritious grasses native to the soils here furnish the chief source of wealth, by feeding many thousands of cattle in the great ranches found everywhere in this vast area, which varies in width from about 100 miles on the Panhandle to 200 along the line of the Texas & Pacific Railway, and is 500 miles long. From stored water, gathered in earth dams built across ravines, stock-water in part, and to some extent water for irrigation, especially for gardens on the ranches, is obtained. By this means irrigation may be greatly extended. Digging wells is a very uncertain means of obtaining water, and the wells which give water are usually deep.

Cotton, oats, wheat, sorghum and a little corn are produced in the eastern parts. Many tree and vine fruits succeed admirably with irrigation, and even without irrigation in the region watered by the upper tributaries of the Colorado, as rains are more frequent and abundant there than in other parts.

The soil is naturally very drought-resisting, and with storage-probably become less arid and more productive.

There are great salt wells at Grand Saline, on the Texas and Pacific Railway, from which considerable salt is made by solar evaporation.

7. *THE STAKED PLAINS.*

THE Staked Plains lie to the west and northwest of the Chocolate Plains, rising above them precipitously in cliffs 200 to 400 feet high, whose margin has an altitude of 3,000 feet above sea level. Thence the surface gradually rises to an altitude of over 4,000 feet. The surface of this remarkable tableland seems to the eye to be a dead level, except the canyons, deeply eroded by the headwaters of the Colorado, Brazos, Red and Canadian Rivers along its eastern borders.

The soil is a dark, rich loam, capable of growing almost anything where watered. Limited irrigation is supplied by windmills pumping from driven wells, which reach abundance of good water at depths of ten to forty feet. The average annual rainfall is from ten to fifteen inches.

There are numerous small lakes found on the plains, especially in their central and western parts. Some of them are intensely salty and have pure crystal salt many feet in depth in their bottoms.

The Staked Plains plateau is about 150 miles wide and extends from latitude 31½ degrees northward into Kansas and Colorado—a distance of about 500 miles.

The climate is very salubrious, but the winters are much more severe than in any other part of Texas, the temperature sometimes falling to 15 degrees and even 20 degrees below zero.

Cattle raising is the only commerical industry. The herds find winter protection in the canyons.

8. *IRRIGATED LANDS OF THE PECOS AND RIO GRANDE.*

THE narrow valley of the Pecos River between latitude 31 and 32 degrees in Texas is partly under irrigation and grows alfalfa, grains, grasses and fruits, especially foreign grapes, to great perfection and profit. A vineyard at Barstow,

of forty acres in extent, has produced very fine crops for several years, having never suffered from attack of phylloxera.

The foreign vines require a covering (it is usually of soil) to protect them through the winter. Outlets to market are found through the Texas & Pacific Railway and Pecos & North Texas Railway. Grapes ripen in this valley in August.

The bottom lands of the Rio Grande on the Texas side from El Paso to some fifty miles below to Fort Hancock on the Southern Pacific Railway are similar to the Pecos City and Barstow region, with climate milder and more arid, and about the same products are raised, which find a market in El Paso and the cities of eastern Texas or the north.

9. *THE TRANS-PECOS ARID REGION.*

THIS section occupies all that extensive triangle lying between the Pecos and Rio Grande south of New Mexico, excepting the mesa lands in Jeff Davis, Brewster and El Paso counties, and the mountains extending above them, noticed separately in the next section.

The Arid Region is excessively dry and hot, yet there is a short, nutritious grass in nearly all parts of it upon which numerous deer and antelope feed. Sometimes as many as 100 in a band are seen.

The altitude varies from 2,000 feet on the lower Pecos to 5,000 in the central and northern parts. The valleys and low mountain ranges are generally waterless to such an extent that stock-water cannot be obtained except in a few favored localities, and these are the seats of the few ranches of this region. Here are the only wastelands of any extent in the State.

MANY of the data embodied in this report, particularly those of Section IV., have been supplied by F. V. Munson, Esq., whose intimate knowledge of the agricultural conditions of Texas is derived from a minute personal obser-

vation and professional study, covering more than twenty-five years and extending to every part of the State. Special acknowledgments are due to Mr. Munson for his courteous and valuable aid, and the very considerable labor which he devoted to collecting material for the committee.

I am also indebted to State officials and to many individuals for published reports and monographs, and for data given verbally; and to several officials of the United States Department of Agriculture, Geological Survey and Library of Congress.

Respectfully submitted,

S. Cristy Mead, *Chairman.*

New York, Nov. 1, 1901.

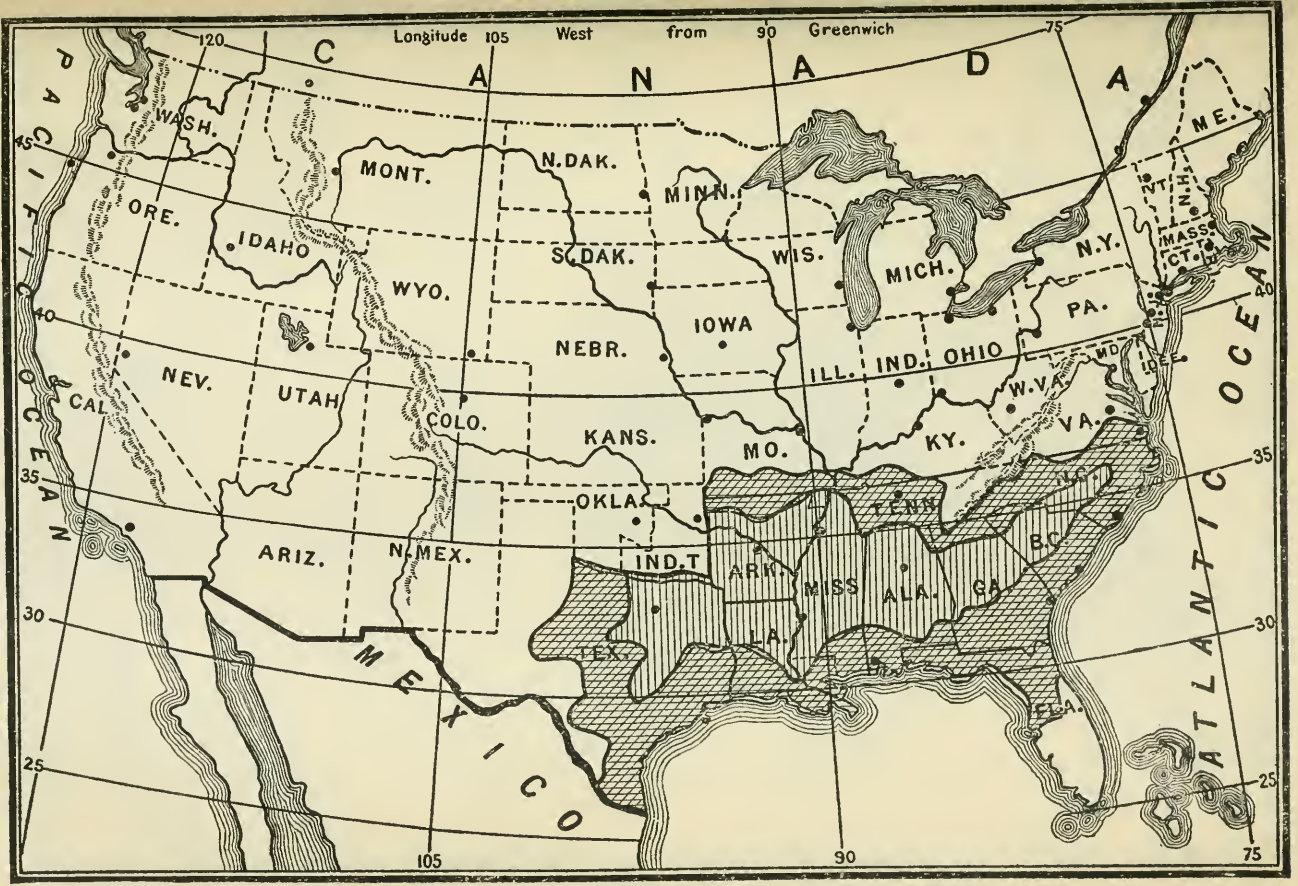

CHART IX.—COTTON DISTRIBUTION OF THE UNITED STATES.

CHART X.—WHEAT DISTRIBUTION OF THE UNITED STATES.

CHART XI.—CORN DISTRIBUTION OF THE UNITED STATES.

CHART XII.—OATS DISTRIBUTION OF THE UNITED STATES.

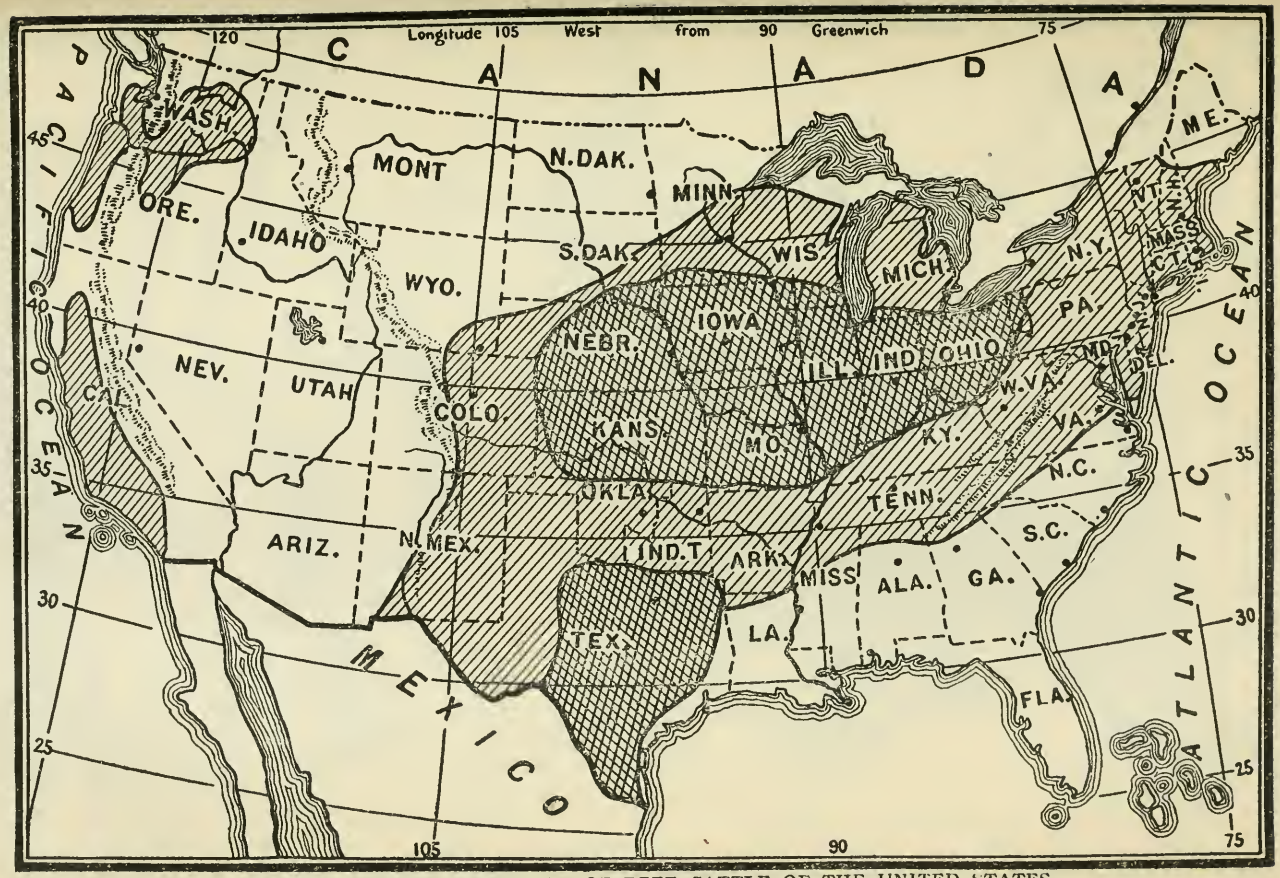

CHART XIII.—DISTRIBUTION OF BEEF CATTLE OF THE UNITED STATES.

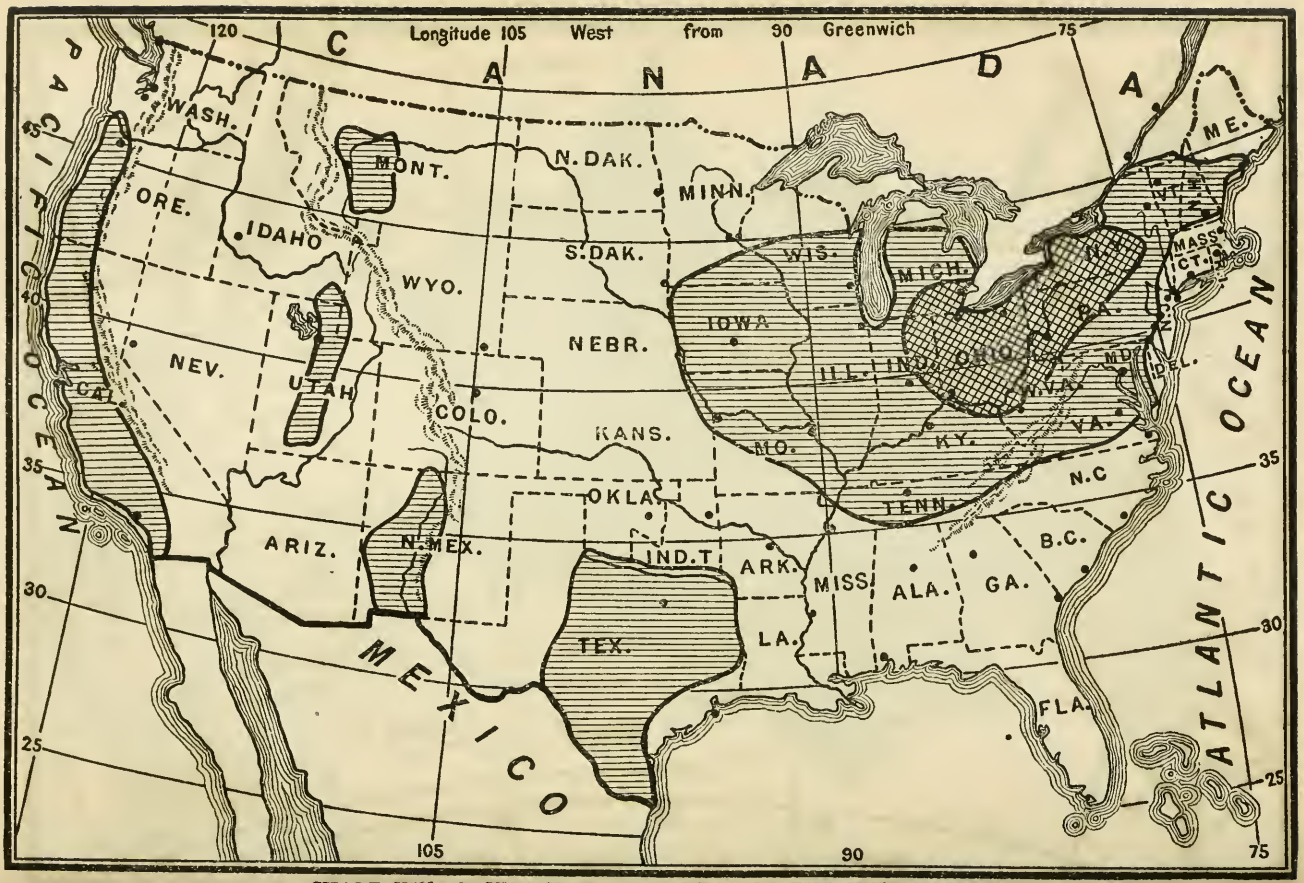

CHART XIV.—DISTRIBUTION OF SHEEP OF THE UNITED STATES.

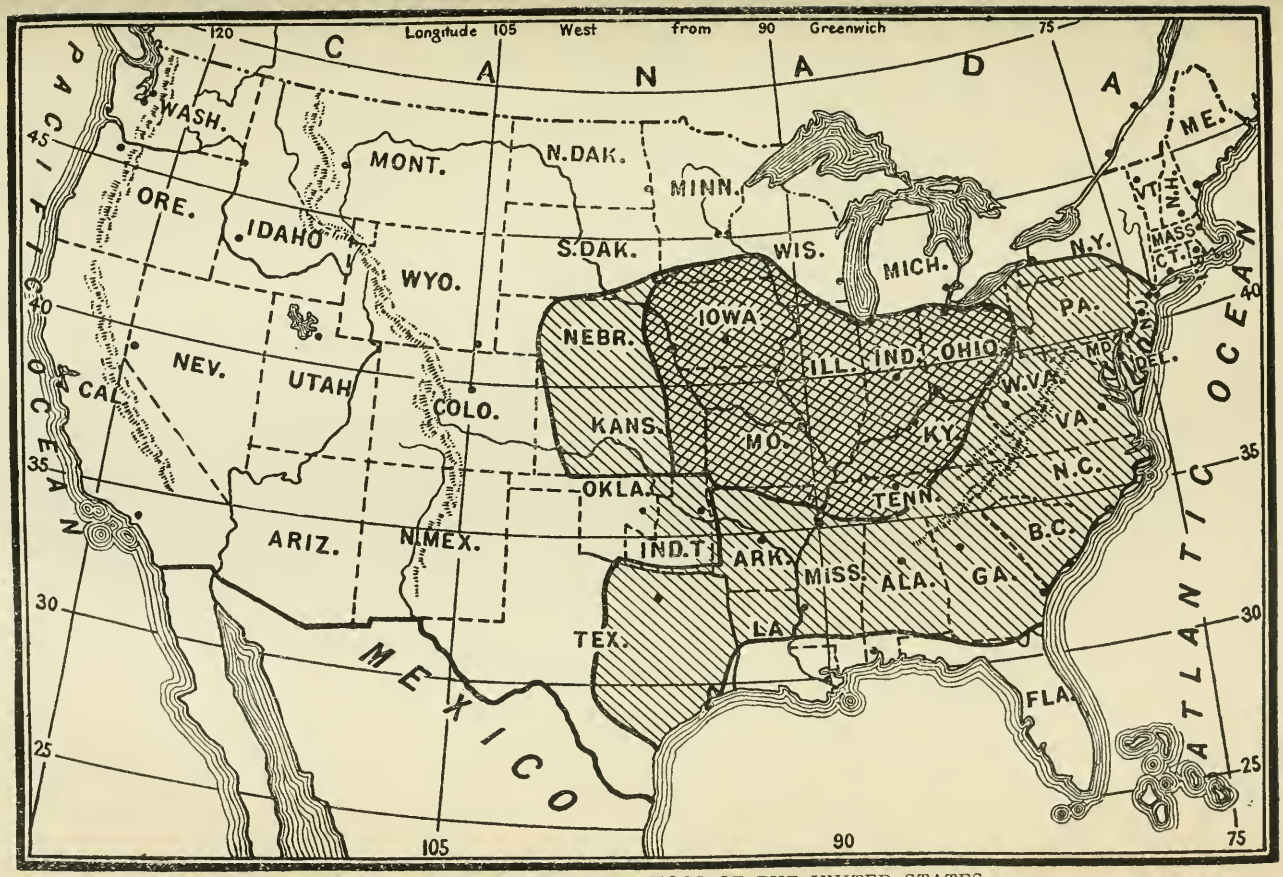

CHART XV.—DISTRIBUTION OF HOGS OF THE UNITED STATES.

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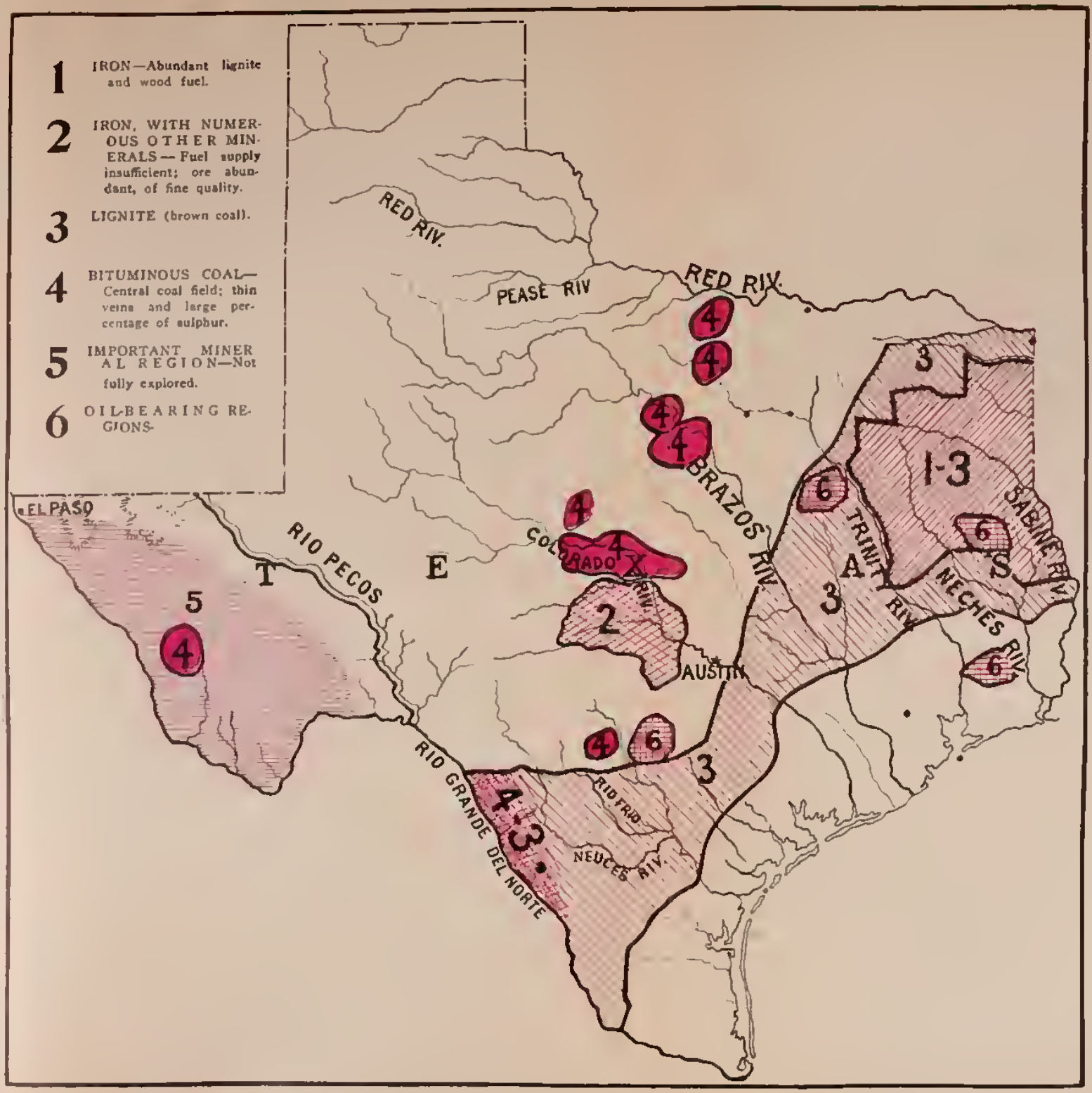

CHART XVI.—DISTRIBUTION OF MINERALS.

THE MINERAL RESOURCES OF TEXAS.

I.
OIL.

OIL is found at Beaumont at depths varying from 965 to 1,250 feet. The strata passed through are loosely aggregated sandstone. More or less difficulty has been experienced in the boring, and in most cases "telescoping" has been necessary. The rotary drill is in general use.

The character of the oil is entirely different from the Pennsylvania product, the Pennsylvania oil having a paraffine base, while the Texas oil has an asphaltum base. The Texas oil is essentially a fuel oil, as shown by the analysis appended hereto, which was made by Mr. Charles H. White, of Cambridge, Mass., for Mr. Thomas Crimmins, of New York. Other analyses are practically identical with the one submitted. It will be seen that the Texas oil furnishes only about 25 per cent. of its volume in illuminating oil.

Nine of the wells bored at Beaumont have been spouting wells, locally known as "gushers." The oil is thrown in a spray to a height of 100 feet or more, when the well is uncapped. These gushers have all been brought under control, and it is quite problematical how long they would remain gushers if uncapped and given a chance to "gush."

The capacity of these wells is remarkable; single wells having by actual measurement flowed 72,000 barrels in one day. The oil pool is evidently deep, and the quantity of oil very considerable. A matter of great interest, however, is the fact that all the producing wells near Beaumont are located on one single 160-acre tract.

RESULTS OF A TEST OF BEAUMONT OIL.

By Charles H. White, Cambridge, Mass.

	Percentage by Volume.	Specific Gravity.	Degrees, Baume.	Temperature. Centigrade.	Flashing Point.		Percentage of Sulphur.	Color.
					C.	F.		
Crude oil	....	.908	24°	17°	96°	205°	0.265	Dark Green
Light oil distilled at 150° C.	5.0	.775	50°	0°	....	....	.....	Colorless
Illuminating oil distilled at 150°-250° C.	25.4	.861	33°	0°	81°	178°	.....	Straw
Lubricating oil distilled at 250°-300° C.	32.0	.875	30°	0°	....	....	.....	Amber
Residue	37.6	....	....	....	....	....	.....	.....
Residue by "cracking"*	12.8	....	....	....	....	....	.....	Black
Illuminating and lubricating oil by "cracking"	82.2	....	....	....	....	....	.....	.....

*Cracking; distilling at high temperature with outlet far removed from boiling liquid, so that distillate condenses and drops back in hot surface, thus breaking it up into lighter oil.

It was the opinion of my drill man that if all the wells were uncapped they would cease to gush within twenty days.

Other outlying districts have been discovered, namely, Sour Lake, and over the Louisiana line, and prospecting for oil has been greatly stimulated. Reports of small amounts having been found come from almost every section of the State.

Without doubt, the fuel oil industry in Texas is without a rival and bids fair to effect economic changes in the various manufacturing industries of the State.

II.

ARTESIAN AND MINERAL WATERS.

RECENT official reports show that every section of the State has its mineral springs or wells. Of these, the mineral wells in Palo Pinto County are perhaps the most famous. In variety and quantity it is probable that no State in the Union equals Texas in mineral waters.

Of the springs, those at Lampasas are the largest. They burst forth from the ground and form the great body of the water of the Lampasas River. Other famous springs are the Carrizo, in Dimmit County; Sour Lake, in Newton County; Sutherland Springs, in Wilson County; Wootan Wells, in Robertson County; Sulphur Springs, in Hopkins County; Hughes Springs, in Cass County; Salado Springs, in Bell County, and Burdett's Well, in Caldwell County.

The artesian wells of this State flow above ground and supply the water systems for some of the cities and towns. Their daily capacity varies from 75,000 to 300,000 gallons a day, and they have a temperature varying from 90 degrees to the boiling point.

The wells at Waco have an average depth of about 1,800 feet. The wells to the east are much shallower, while those to the west are deeper.

Numerous minerals have been encountered in sinking these wells, but as yet none of commercial value have been exposed.

Probably the most famous of the artesian wells is at Marlin. The water is hot, and has various medicinal properties, and, in consequence, the little city of Marlin, in Falls County, has become one of the great health resorts of the trans-Missouri country.

III.

BUILDING STONES.

OUR committee was next brought into contact with the mineral resources of the State at Marble Falls. The granite quarries of the Texas Improvement Company are of great extent, and the stone of excellent quality. The colors vary from red to light gray. A series of tests made at the Rock Island Arsenal by the United States Government and certified to the Texas State officials, show a crushing strength for the granite of 11,482 pounds to the square inch, which, if correct, places this stone at the head of all building granites for resistance to crushing. The State Capitol, the great dam across the Colorado River at Austin and the jetties at Galveston are constructed of the red granite of Burnet.

While our committee visited the counties of Llano and Burnet only, this granite is said to be found in Blanco County, the colors being red, blue and yellow.

Marble, slate and lithograph stone also exist in Burnet, but no sufficient tests have been made to warrant statements as to their value and character. The marbles of Brewster County are of the black and variegated varieties, and are said to equal any on the continent.

A number of samples of iron ore were seen in Llano, comprising the specular and magnetite varieties. The product of pig iron in Texas in 1898 is stated at 5,178 tons; in 1899, 5,803 tons, and in 1900, 10,150 tons. It is said that considerable iron ore has been shipped from Iron Mountain, in Llano County, to Birmingham, Alabama, and this, after hauling thirteen miles over wagon roads. Iron ore appears to exist in large quantities in Llano, Cherokee and Cass counties.

IV.
GOLD AND SILVER.

IT has been my fortune, or misfortune, to examine a great many gold and silver mines in the State of Texas. The result of twenty years' experience convinces me that the precious metals do not exist in paying quantities in Texas, except in those western counties bordering on New Mexico and the Rio Grande River. The total output of the State is said to be about $900,000, nearly all of which is silver.

V.
COPPER.

THERE are many indications of copper in Texas, and in Llano County these fully justify exploration. Archer and Baylor Counties have produced a small amount of surface ore within the past twenty years, but thus far nothing of value has been found. In 1881 I purchased the output of Archer and Baylor Counties, and treated it at the St. Genevieve Copper Works in Missouri, of which I was then manager. The ores were insignificant in quantity, amounting to only 167 sacks, weighing in all about thirty tons, but were exceptionally rich, returning about 60 per cent. metallic copper.

VI.
COAL.

NO opportunity was given the committee for personal examination of the coal mines. The following statements are, therefore, compiled from various sources, and from the work done by the writer in previous years.

Texas produced no coal in 1880. In 1890 the output was 128,216 tons, and in 1900, 1,013,000 tons. The largest producing mine is that at Thurber on the Texas Pacific Railroad, on the line of Erath and Palo Pinto Counties.

Those at Laredo, Rockdale and near Calvert in Robertson County are said to be doing a profitable business, and are of growing importance. Coleman and McCulloch Counties are also said to be underlaid with coal, but are undeveloped. It has been estimated that the coal area of Texas embraces 40,000

square miles, and extends from the Red River as far southward as Laredo.

Indications of natural gas are found in many places, and the gas is utilized to some extent on some Brazos plantations near Hearne, in Robertson County.

In 1883 the writer examined the coal lands of the Franco-Texan Coal Company, covering Stevens, Palo Pinto and Eastland Counties. I am inclined to believe that the coal beds occur in the Permian, and are not true coals, but lignite. I am also of the opinion that the others coals in the State are of the same character, as I have been unable to find the true coal measures as far as my investigations went.

VII.
GYPSUM.

THE gypsum beds of northwest Texas are said to be the most extensive in the world. The only use now being made of them is the manufacture of a superior quality of plaster. Your committee did not visit these deposits.

VIII.
CONCLUSION.

TEXAS is a State of such magnificent distances—an empire within itself—that a proper investigation of its mineral resources would require not a few days but a few years. It would require considerable hardihood to definitely state that any mineral is lacking. On the other hand the idea of this report is to publish to the world known facts rather than speculations.

In every section we found a vast amount of matter indicating the existence of the various economic minerals, and in almost every section it seems to me that further exploration is warranted.

Very respectfully submitted,

FRANK NICHOLSON, *Chairman,*
THOMAS CRIMMINS,
H. A. METZ,
Committee on Mineral Resources.

New York, Nov. 1, 1901.

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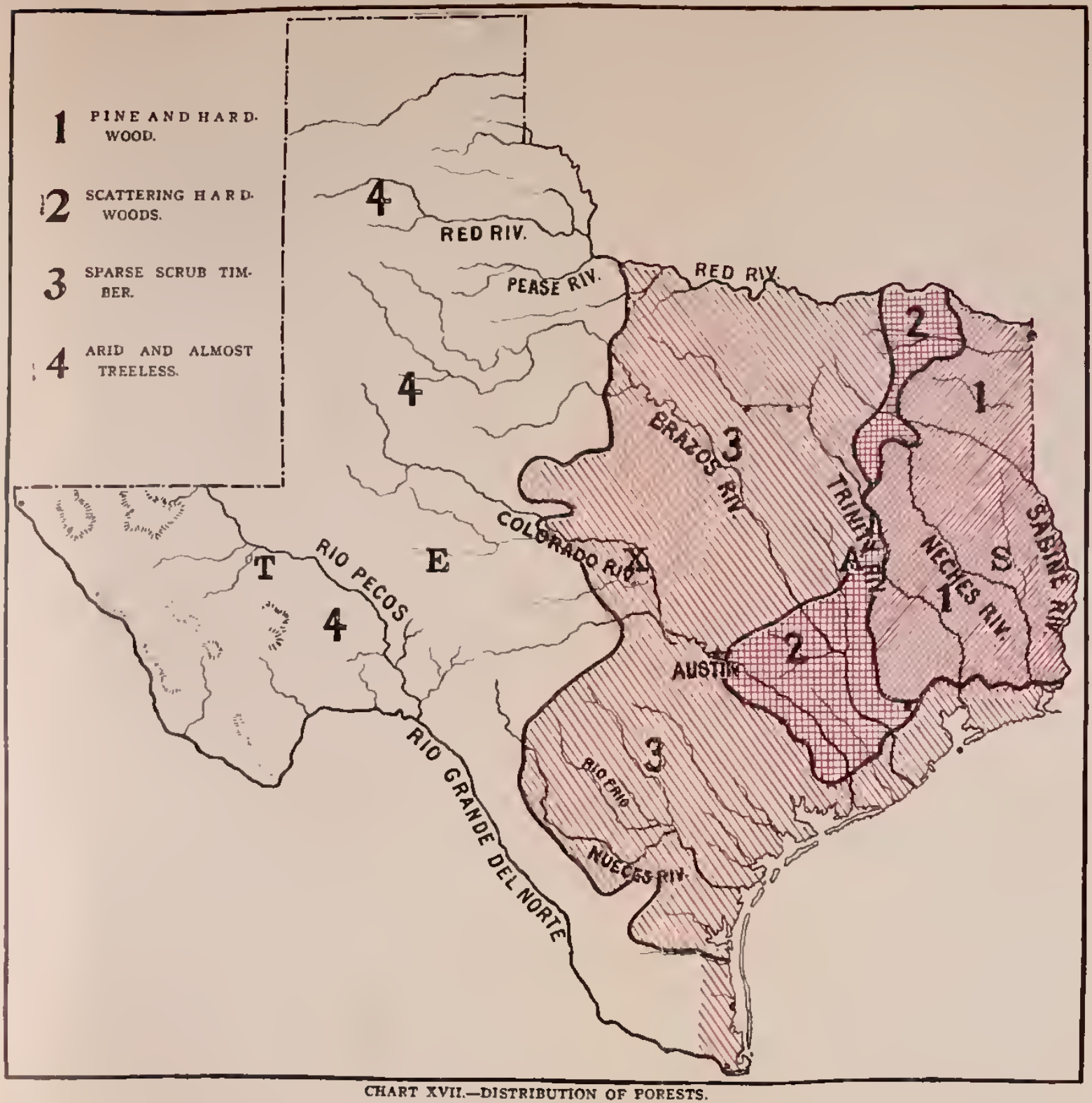


CHART XVII.—DISTRIBUTION OF FORESTS.

THE FOREST RESOURCES AND LUMBER INDUSTRY OF TEXAS.

THE forest resources of Texas comprise a large area of dense pine forests and a lesser area of hardwood forests, intermingled with various softwood timber trees, which, together make up a distinctively lumber-producing region of great economic importance; a larger area, whose forest growth is mainly in narrow fringes along the watercourses, and too limited in exten[t] to support any but a local and temporary lumber industry; and considerable belts of stunted timber of little economic value, being unsuitable for manufacturing uses, and valuable only for posts, rough beams or poles and fuel.

The limits of these several areas are shown approximately by the accompanying chart. Outside of the great forest region of Eastern Texas the forest products are very minor elements of the aggregate natural resources. The timber supply is not sufficient to develop any commercially important industry on a large scale, although some woodworking industries may find a profitable local field. Only a limited quantity of hardwood is available, and it cannot be economically converted into timber or lumber because of its scattered growth and the consequent relatively large cost of logging. The forest products of these regions, therefore, although of great economic value for local use, are of small value commercially in the wide sense of that term. Exceptions are those varieties of trees which supply timbers for restricted special uses, and which are either of narrow range or very widely scattered growth. Examples are live-oak, of dense growth but confined to narrow areas and in limited non-local demand for ship timbers; and hickory, widely distributed, but nowhere plentiful, requisite for certain industries and obtainable only by gleaning everywhere.

The streams of the eastern coastal plain are bordered by a heavy growth of timber of various kinds. To the west live-oak predominates, the growth progressively becomes less dense, decreases to scattering groups and single trees, and finally ceases entirely at the Colorado River.

The timber growth of the prairie zone is that characteristic of all true prairie lands, namely, scattering groups of trees of many varieties, very open except in bottom lands and seldom of great extent—conditions opposite to those of true forest regions, where continuous density is the rule. The wooded areas become less frequent and the variety and size of the trees decreases as the central plains region is approached.

Throughout that great expanse forest growth is very scanty, and, with the exception of the two belts called the Cross-Timbers, is confined to narrow and broken fringes in the valleys. There are almost no valuable timber trees in this region, most of the Cross-Timbers growth being scrub, useful only for fuel, while the taller growth in the bottoms is of cottonwood, pecan and similar varieties not useful for lumber or timber. The so-called Cross-Timbers are two parallel belts about 50 miles wide, extending southward from the Red River Valley about 150 miles into the central plain.

The eastern portion of Texas is a true forest region, covered with dense and almost continuous growth over an area whose extension north and south is about 300 miles and whose maximum width is 150 miles near the southern extremity, decreasing to less than 100 miles on the north. Somewhat more than half of this region—the southern part—bears upon the uplands a dense pine forest, comprising the several varieties of yellow pine indigenous to southern latitudes, and intermingled upon the lower slopes and bottoms with a great variety of other trees, including oak, elm, maple, gum, poplar, hickory, pecan, walnut, magnolia, etc. These forests have very great economic value, by reason of the density of growth, size and quality of the trees and the great quantity accessible from any given point. Moreover, the conditions necessary for cheap and profitable development are peculiarly favorable, the elevation being considerable, with numerous watercourses, whose ample and persistent volume affords a maximum of water transit and makes the proportion of haulage relatively small.

Toward the northern part of the forest region the pine growth gradually gives place in large measure to other varieties, among which the producers of valuable cabinet woods predominate, including maple, walnut, oak, ash, beech, elm, gum, sycamore, hickory, poplar and others. In fact, the entire region comprehending the southern slopes of the Osage highlands, the central part of the Red River Valley and the uplands about the sources of the Sabine River, is among the richest, most varied and most prolific forest regions in the United States.

Portions of this great forest area are underlaid by valuable deposits of iron ore, and as the smaller timber will supply an abundance of charcoal fuel, the lumber industry may be readily supplemented by mining and iron smelting, the economic conditions being favorable to both.

Within very recent memory the State of Michigan was the great lumber-producing State of the country. To-day Michigan stands practically cleared of its white pine, and the men who were operating actively have gone but lately to Canada, Minnesota and the Pacific Coast States. The amount of white pine cut each year steadily increases, and to-day the lumberman who looks furthest into the future finds himself confronted with a very serious question as to the future lumber supply, for on the best obtainable estimates, at the present rate of cutting the supply of white pine in this country and Canada will last only about fifteen years more.

Of late years many large lumber interests have been turning their attention to the South as a profitable field for investment, and the opening up of new territory by increased railroad facilities has greatly increased the yearly production of lumber in the various Southern yellow-pine States.

Lack of labor and inaccessibility of the forest lands are difficulties in the way of operating the lumber fields in most of the Southern States. The latter difficulty is less in the State of Texas than in many others. It is estimated that in the Texas forest region there are some seventy billion feet of standing timber. To a very large extent this timber is made accessible by good logging streams, which open up the country very cheaply, although the railroad facilities are scanty. The result of this has already begun to show itself, and to-day Texas

has some of the best-equipped and most modern sawmills in the country, from which mills the product of the log is turned out at a cost comparing very favorably with the best equipped mills of the North. These mills being located, as a rule, practically on the seaboard, afford very favorable means of water shipment to any part of the country or the world. Speaking from a standpoint of physical conditions, there would seem to be no reason why the State of Texas, so far as yellow pine is concerned, should not occupy in the Southern States the commanding position that the State of Michigan used to occupy among the white-pine producing States.

To conduct a lumbering business profitably requires the purchase of a large area of timber lands and a proper equipment, which demands the investment of a large amount of money; and the ordinary business man, as a rule, is very careful of the conditions under which such an investment is made. Any feeling, however intangible it might be, to the effect that the legislation or sentiment of a given State is inimical or hostile in any way to vested rights, would make the average business man hesitate and perhaps refrain entirely from investing. The natural resources of Texas as a lumber State are very hard to equal in this country; and the natural conditions seem to be very attractive for the investment of capital. But the great capital necessary to operate a large lumbering plant to the best advantage cannot easily be brought together except in the corporate form, and legislation hostile to foreign corporations must necessarily tend to discourage them from subjecting themselves to it. Whether true or false, the belief is widely current that public sentiment in Texas deems the corporate form of capital harmful to the public welfare, and therefore worthy of severe restrictions and penalties with which other forms of capital are not burdened. Moreover, corporate capital from without the State is supposed to be regarded by that public sentiment, not as an instrument for multiplying the riches of the State, but on the contrary for abstracting them and taking them away, and, therefore, to be impeded as much as possible by severe and discriminative taxation.

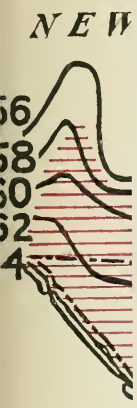
Beyond question this belief, no matter whether prejudiced or well founded, has deterred investment in Texas and materially hampered its development by leaving it dependent upon its in-

sufficient home capital. There can be little doubt that a policy of wise encouragement in the form of liberal taxing laws, non-discrimination against corporate capital, and reasonable special privileges, immunities or franchises as a guarantee against the hazards of new enterprises, would result in a great influx of capital to develop the enormous natural resources of the State of Texas. Among the most inviting of the fields whose development awaits that influx of capital, the lumbering industry stands with the first.

Respectfully submitted,

W. H. GRATWICK,
Committee on Lumber.

Buffalo, N. Y., Nov. 1, 1901.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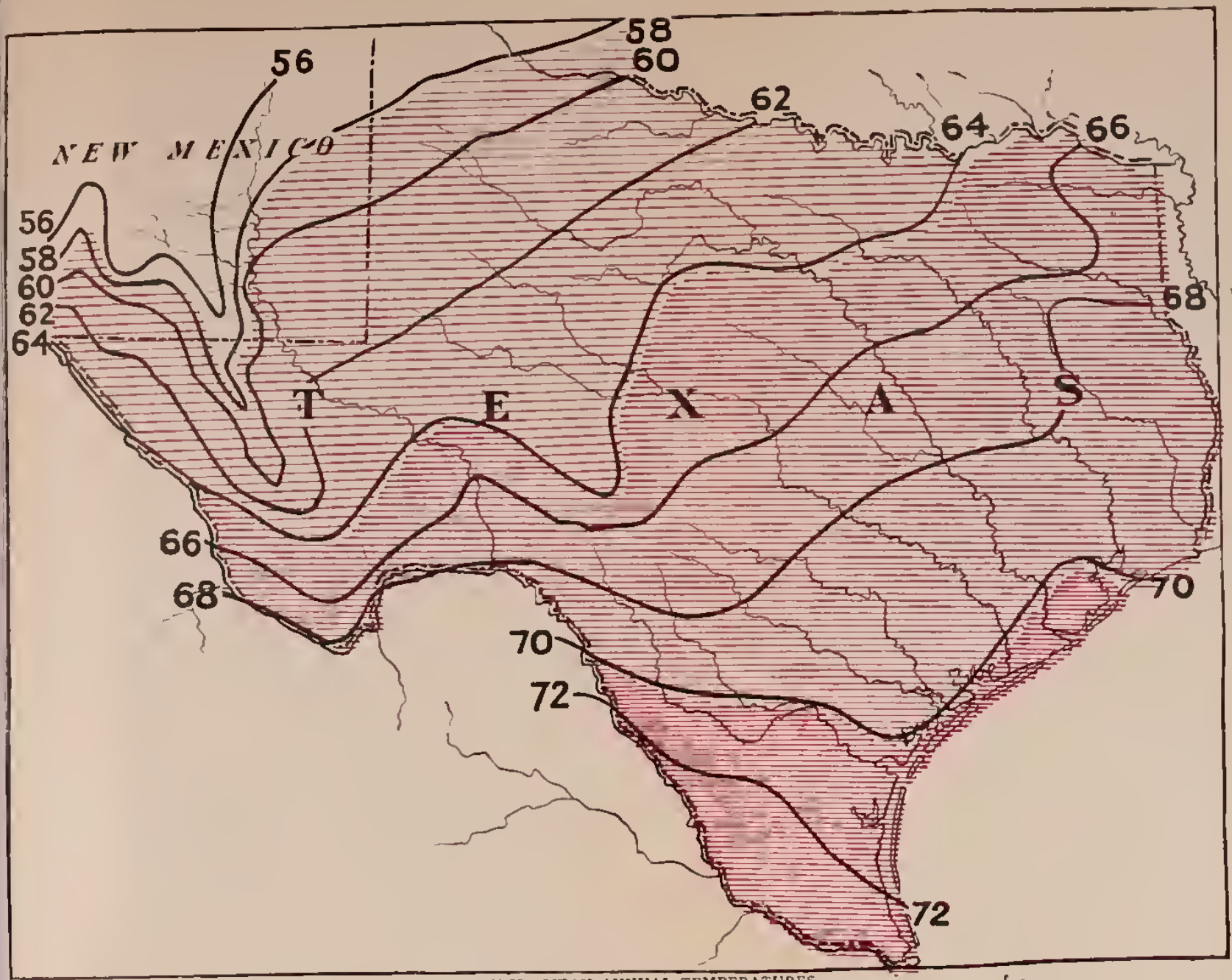

CHART XVIII.—MEAN ANNUAL TEMPERATURES

HEALTH CONDITIONS AND CLIMATE OF TEXAS.

I.
INTRODUCTORY.

IN considering the question of public health in such an extensive territory as that covered by the State of Texas a large number and variety of circumstances call for notice. In the first place there are purely natural conditions which are inseparably connected with the country, such as result from latitude, geography and climate. In the second place we may expect to find circumstances which modify these natural conditions, such as public work, laws and other governances for the regulation of public health. Although modifying circumstances are not of conspicuous importance in assisting the natural tendencies of health in the territory under consideration, it is true of Texas as of other great commonwealths that public health cannot be wholly satisfactory without the harmonious operation of these two great factors.

II.
NATURAL HEALTH AND CLIMATIC CONDITIONS.

THE principal health conditions which are natural to Texas arise both from circumstances which lie strictly within the State and others which result from her position with respect to outside territory.

Considered without respect to outside influences, Texas presents a great variety of natural conditions.

SECTIONAL CHARACTERISTICS.

THE coast line is low and flat, extending back from 50 to 100 miles before it attains an elevation of 250 feet. For ten months or more each year the winds blow from the Gulf of Mexico, and, in consequence, changes of temperature are slight, but there is considerable humidity. Diseases of the respiratory organs and those associated with excretion and malaria are among those most prevalent.

In the eastern portion of the State, bordering on the Red River, the land is also low. Here the rainfall attains its maximum for the State of Texas. Conditions of drainage are similar to those of the Gulf coast, without the advantages which result there from reduced temperature variations. In the northeast the mortality is higher than for any other part of the State, illness being most common from malaria, diseases of the throat and lungs and of the nervous and digestive systems.

Proceeding from the coast and eastern borders toward the northwest the natural conditions of health in Texas rapidly improve. So far as is known, the circumstances which favor illness are practically absent in the Great Plains and elevated portions of the State.

As regards altitude it may be said that the general slope of the land is toward the northwest. A contour line of 1,000 feet elevation divides the State into two nearly equal parts, there being no point above that level to the east or south and no point below it to the north or west. The 1,000-foot contour runs south from the Red River to Austin and from Austin in a southwesterly curve to Del Rio on the Rio Grande. The most fertile part of the State, and the section of greatest rural population, lies at an elevation of from 400 to 700 feet. Many large cities are situated between these altitudes. The prevailing winds blow from the south, and to some extent carry the advantage which is given to the coast land by the governing character which the warm waters of the Gulf exercise upon the temperature of the air. The country has good natural drainage

and the water supplies are favorable to health. It is an interesting mark of the business perspicacity of the people of this region that the cities in East Central Texas bear evidence of greater care in sanitary administration than is generally found elsewhere. The types of disease which have been mentioned as occurring upon the coast and most prevalent in the northeastern part of Texas are not common in the area under consideration.

A second contour line, and one which has a uniform elevation of 2,000 feet above the sea, extends from the eastern border of the Panhandle in a southeasterly direction to the mouth of the Pecos. The slope of the land is irregular, and there are numerous rivers running in deep valleys. There are less than one-tenth the number of persons to the square mile on land lying between 1,000 and 2,000 feet above tidewater than below it. The main occupation of the people is cattle raising. The drainage and climate are favorable to health.

A third contour, 3,000 feet above the sea, cuts diagonally across the Panhandle in a southwesterly direction. This is the area of the Great Plains, or, as it is sometimes called, the semiarid country. Near the 3,000-foot contour most of the great rivers of Texas take their source. In the northwest the soil consists largely of gypsum and the population is very scant. Very little is known about the health conditions.

TEMPERATURES.

FROM what has been said it is to be inferred that temperatures in Texas depend largely upon geographical position, elevation and especially distance from the Gulf. Beginning in the northwestern corner, at Hartley, the annual average temperature is 54.7 degrees Fahrenheit. From this point the temperature increases gradually, until the coast is reached, where the average for the year is 20 degrees warmer. Running parallel with the coast, lines of equal temperature may be drawn, their distance apart being generally about forty-three miles for each change of one degree. In winter the temperature in the north may be 27 degrees lower than in the south, while in summer the difference is seldom greater than from

3 to 8 degrees. The average summer temperature for the State is from 78 to 84 degrees.

The first killing frost occurs in North Texas in the middle of October, but in the south it is not expected until about Christmas time. The last killing frost seldom occurs after the first of April in the northwest, while in the south it is not expected later than the first of February. Winters in Southern Texas are very mild, frost seldom lasting over a day or two, and on the immediate coast it has occurred only five times in twenty-four years.

IRREGULARITIES OF CLIMATE.

ECCENTRICITIES of climate, such as droughts, tornadoes and floods are not as frequent in Texas as in some other parts of the great Southwest. Of the five extensive droughts which were experienced in the United States from 1870 to 1890, three did not visit Texas; the other two appear to have been less severe there than elsewhere. In a list of fifty-eight of the most destructive tornadoes which occurred in America from 1872 to 1890, only three are noted as having been felt in the State.

Rainfall in Texas is not always a reliable feature of climate. In a large part of the State, particularly in the south and east, there is usually an abundance of rain as reckoned by an annual average. Most of the precipitation occurs in heavy showers and the distribution of rain during the season when it is most needed by crops is liable to fluctuations. There is, however, usually no trouble from droughts, as previously noted. Over, perhaps, one-half the State the evaporation equals or exceeds the annual and seasonal rainfall. A feature of the agricultural districts of Texas which has been developed to some extent and is capable of much further application is the plentiful supply of water to be had underground. By irrigation the crops can be watered in a manner which discounts irregularities of precipitation. The heaviest fall of rain on record occurred in June, 1899, near the head waters of the Brazos. On that occasion 2,000 square miles of country are said to have experienced a rain of about thirty inches in less than four days. Considering the enormous volume of water which is required to be

DATES OF LOWEST AND HIGHEST AND OF CERTAIN OTHER DAILY MEAN TEMPERATURES.

The following table shows, for stations in Texas, the lowest mean daily temperature and the date of occurrence, the highest and date, the dates on which the temperature in the new year first reaches 32°, 41°, 50°, 59°, 68° and 77°.

No.	Station.	Lowest, with date.	Highest, with date.	Daily means 32° or less.		Number of days.
				From—	To—	
1	Fort Elliott	°21 Jan. 19	°77 July 14	Jan. 1	Feb. 8	39
2	Fort Sill	28 Jan. 8	83 July 13	Jan. 1	Jan. 15	15
3	Denison	*31 Jan. 8	*84 July 13	*Jan. 8	*Jan. 12	5
4	Abilene	36 Jan. 8	85 July 12	None.		
5	Palestine	38 Jan. 9	84 July 8	None.		
6	Fort Concho	*35 Jan. 5	*81 July 1	None.		
7	Fort Davis	33 Jan. 1	78 June 25	None.		
8	San Antonio	48 Jan. 8	85 July 12	None.		
9	El Paso	38 Jan. 1	85 June 24	None.		
10	Shreveport, La.	40 Jan. 9	85 July 9	None.		
11	Galveston	48 Jan. 9	86 July 8	None.		
12	Indianola	49 Jan. 1	84 July 7	None.		
13	Rio Grande City	51 Jan. 1	88 July 9	None.		
14	Brownsville	53 Jan. 1	85 July 14	None.		

No.	Station.	Daily means above—						
		41°.	50°.			59°.	68°.	77°.
		From—	From—	From—	No. of days.	To—	From—	From—
1	Fort Elliott	March 11	March 30	*Nov. 6	*202	April 30	June 2	July 14
2	Fort Sill	*Feb. 12	March 11	*Nov. 2	*237	April 3	May 9	June 10
3	Denison	*Jan. 30	*March 5	*Nov. 21	*262	*April 10	*May 2	*June 9
4	Abilene	Jan. 19	Feb. 21	*Nov. 20	*273	March 26	April 29	June 8
5	Palestine	Jan. 13	Feb. 3	*Nov. 19	*290	March 14	April 19	June 7
6	Fort Concho	*Jan. 20	*Feb. 14	*Nov. 14	275	*March 27	*May 10	*June 9
7	Fort Davis	Jan. 22	Feb. 21	*Nov. 23	*276	March 28	May 11	June 9
8	San Antonio	(†)	Jan. 10	*Dec. 11	336	Feb. 25	April 7	May 24
9	El Paso	Jan. 6	Feb. 13	*Dec. 7	298	March 26	April 26	May 27
10	Shreveport, La.	Jan. 10	Feb. 6	*Dec. 5	303	March 18	April 14	May 26
11	Galveston	(†)	Jan. 12	Jan. 8	360	Feb. 19	April 7	May 19
12	Indianola	(†)	Jan. 2	Dec. 29	*360	Feb. 12	April 4	May 20
13	Rio Grande City	(†)	(†)	(†)	365	Jan. 27	March 4	April 14
14	Brownsville	(†)	(†)	(†)	365	Jan. 22	March 13	May 5

Interpolated.* † None below.

carried off by the river system, the damage to property was not great.

A feature of climate supposed to be peculiar to Texas is known as the norther. A norther is a cold wind from the north or northeast, sometimes accompanied or followed by rain or snow. The storm may last from a day to three or four days. Severe northers seldom occur from May to September, and the total number per year appears to be not over from five to twelve. Northers, or cold waves, are most severe in winter among the cattle and sheep ranches of the plains, where they have done great damage in times past. More recently, however, better precautions for the care of stock and a prudent attention to storm warnings sent out by the United States Weather Bureau have reduced the losses occasioned by these storms.

HEALTH RESORTS.

THE favorable notice which several cities of Texas have received on account of the benefits to health which have been derived from their dry climate, has attracted many persons suffering from pulmonary tuberculosis. The section most favorable to such forms of illness lies west of the 98th meridian and north of the 30th parallel. The best-known cities for consumptives are El Paso and San Antonio.

El Paso is situated at the extreme western border of Texas at an elevation of nearly 4,000 feet. The climate is very dry, the average rainfall being nine inches per year. The average temperature for the year is 64 degrees Fahrenheit, with a minimum of 44.3 degrees in January and a maximum of 82.5 degrees in July. There is a public water supply obtained from wells, and the streets are partially paved and sewered.

San Antonio is one of the most picturesque and attractive cities in the Southwest. It is situated at an elevation of about 600 feet above the sea in a part of the country which is interesting for its historical reminiscences and for its typical appearance as a cattle-raising center. The average precipitation at San Antonio is 33.07 inches per year; the average temperature is 68.9 degrees Fahrenheit, with a minimum of 60.6 degrees in

January, and a maximum of 83.8 in July. There is an excellent public water supply, over seventy miles of sewers and nearly eighty miles of paved or macadam streets. It is one of the few cities of Texas in which vital statistics are regularly kept and which have a code of sanitary ordinances which are enforced by reason for a strong public sentiment.

There are many points in Texas which enjoy the advantages of mineral waters and a climate favorable to diseases of the respiratory organs, kidneys, rheumatism and disorders of the blood and skin. Among resorts frequented by patients suffering from pulmonary difficulties are, besides San Antonio and El Paso, Fort Davis, Kerrville, New Braunfels, Lampasas, Brownwood and Wichita Falls. Spring waters which possess medical properties are found at San Antonio; Burdetteville in Caldwell County; Marlin, Falls County; Mineral Wells, Palo Pinto County; Lampasas Springs, Lampasas County, and Wooten Wells, Robertson County.

The position of Texas with respect to outside territory has given to the State many characteristics of health and climate better known as existing in adjacent regions. Thus we find among the range of influences features common to the Gulf Coast, Mississippi Valley, Great Plains, Pacific Slope and Mexico. As regards weather, whatever variability exists in rainfall is ascribed to the fact that Texas is the meeting place of dissimilar types which originate beyond her borders. In some cases there is an overlapping of the territory appropriated by each. The Gulf type of rainfall extends as far west as Abilene, the Great Plains type as far south as San Antonio and the Mexican type as far north as Lampasas. In respect to the types of infectious diseases which are apprehended in consequence of the nearness of territory considered dangerous from this point of view, it may be said that cholera is assumed to approach from the sea, bubonic plague chiefly from California, smallpox from Mexico and yellow fever from nearly the whole of the southerly borders.

III.

CARE OF PUBLIC HEALTH.

IT appears that the principal health conditions which are thought to require regulation in Texas arise from the fear of importing infectious diseases into the State. By reason of her great length of coast and inland border it is necessary to maintain a constant guard against epidemic diseases which are generally close at hand, the danger being more real from the fact that conditions in Texas are often such as to favor the spread of epidemic diseases. Among the acutely infectious diseases to which Texas is most exposed are smallpox, bubonic plague, typhus and yellow fever. Yellow fever is the principal cause of alarm. A favorable environment to it is afforded by the combined effects of warm climate, want of sanitation in cities and towns and lack of general knowledge as to the most effective means of combating the disease.

STATE HEALTH ORGANIZATION.

THE health organization of the State consists in a Health Officer appointed by the Governor, County Physicians appointed by the District Commissioners and Town or City Health Officers. Theoretically the county health officers are under the direction of the State Health Officer, and they in turn exercise authority over the territory in their charge. Practically, however, there is not sufficient binding power in the organization to make it effective. No legal provision exists for the punishment of infractions of State orders or regulations relating to health. Ordinarily the central authority is not exercised. In times of emergency it is customary for the State Health Officer to take the field and direct operations for the State in person.

There are many sources of complaint for the want of a thoroughly organized central health department in Texas, not the least of which relates to the absence of provision for the collection of vital statistics. No vital statistics are collected.

In the absence of data regarding the distribution of disease the healthfulness of the cities and towns is not accurately known. Nearly all the cities have water supplies, many of them

obtained from wells of excellent quality. Sewerage systems are not so common, and the use of broad, deep street gutters for the accommodation of liquid house drainage and the overflow of cesspools is not unusual. Streets, as a rule, are not paved except in the larger cities. The cleaning of streets and the collection and final disposal of garbage are subjects which have not thus far reached the attention they deserve. As is frequently the case in Southern cities, a free use of disinfectants too often takes the place of the means of preventing diseases which are based upon thorough order and cleanliness.

QUARANTINE.

THE operations of the State health organization are exclusively confined to the operation of quarantine, for the administration of which the State Health Officer receives an annual salary of $2,500, and an appropriation which, in 1890, amounted to $34,500. At various points of traffic across the boundary of the State there are located quarantine stations, among the more prominent of which may be mentioned those at Sabine Pass, Galveston, Velasco, Brownsville, Corpus Christi, Laredo, Eagle Pass and El Paso.

It is customary for the Governor to issue a proclamation each spring, declaring quarantine against seaports south of 25 degrees north latitude, the duration of this embargo usually extending to about six months. To these regulations and to the provisions of the State quarantine law (Title XCII., Revised Civil Statutes), which contains the authority upon which the quarantine regulations are founded, there has been an active protest by the medical profession and business fraternity for years. The argument is made that the regulations are unnecessarily severe, subject to various interpretations requiring an unauthorized exercise of power for their enforcement, and that they are liable at critical times to fail in accomplishing their purpose. There is no doubt that the quarantine regulations, as often interpreted, are very severe. In this connection it is interesting to refer by comparison to the action of other Southern States which are also exposed to yellow fever. Realizing the commercial importance of establishing uniform and intelligent regulations for the management and prevention of yellow-fever

epidemics, all of the Gulf States, with the single exception of Texas, have adopted a code of quarantine rules known under the term of the Atlanta Convention. There is no clear reason why Texas has not availed herself of the benefits thus offered. Not only would such action aid in protecting her citizens, but it would greatly lighten the restrictions now placed upon commerce. As to the interpretation which may be put upon the existing quarantine law in Texas, it is only necessary to refer to the frequent misunderstandings which have arisen in its administration. It has been pointed out that the State Health Officer, while nominally in authority, has not been vested with the power of enforcing his directions by legal process. Instances of the arbitrary nature of the power of direction shown during yellow-fever scares amply demonstrate his difficulty in overcoming the natural prejudices of people accustomed to the crude methods of the shotgun quarantine.

Under the circumstances it is natural that numerous accusations of abuse of power should have been made in the medical and public press against the State Health Officer and those who have been called upon to act in concert with him. How far these gentlemen have laid themselves open to such criticism it is not here necessary to say. Their positions have been difficult to occupy to the satisfaction of all interests.

The cause of sanitation has made slow progress throughout the South, and Texas does not stand alone in failing to take due account of the advantages which modern science offers in avoiding communicable diseases. It is not only in Texas that we see the onerous and trade-killing absurdities of a totally suspended traffic, quarantined by reason of an excited body of citizens armed with shotguns and rifles, the stampede and panic which occur with the appearance, or a rumor of the appearance, of yellow fever. Nor is the apparent indifference with which modern cities of the South regard advanced methods of sanitation and health administration confined to Texas. It is not intended to condone the quarantine customs and lack of sanitary improvements which, to an impartial eye, are clearly open to criticism, but rather to point out that the practical improvements demanded in her methods of avoiding epidemic diseases must be applied in accordance with natural conditions which are deeply seated and widely prevalent.

RELATION BETWEEN SANITARY AND COMMERCIAL PROGRESS.

THE intimate relation which everywhere exists between commercial and sanitary progress was never so manifest as it is to-day. In any nation, State or city of marked commercial enterprise, it will not be difficult to recognize unmistakable evidences of sanitary enlightenment. On the other hand, the foci of disease which constitute the present plagues of the human race are centers of poverty and filth. Wherever the progress of trade exhibits a strong and unencumbered growth, provision has been made, or must soon be undertaken, for the avoidance of the danger which is seen in large ratios of illness and mortality.

From a practical standpoint the most powerful champions of sanitation in Texas are the business men. Theirs are the interests upon which the advancement and stability of the country very largely depend. It is hardly likely that conditions which are capable either of insuring their commercial progress or menacing trade should long pass without their notice.

In the industrial awakening which is now taking place, improved sanitary measures are certain to be inaugurated. The losses to business interests, owing to defects in the health laws, by making themselves more and more evident, will in course of time bring about their own remedy. In a few years such a loss as that of 1898 suffered by railroads, shipping, merchants and others engaged in trade, estimated at from $3,000,000 to $5,000,000, and resulting from a mere scare of yellow fever, will be impossible.

IV.

CONCLUSION.

A BRIEF enumeration of some of the main points which it has been intended to touch upon in the foregoing remarks may be conveniently made here. An examination of health conditions in Texas gives assurance that there is an immense and diversified territory open for the various developments of trade and agriculture which has been richly endowed with natural circumstances favorable to health. Along the coast and river bottoms, malaria,

that form of disease which is most discriminated against by life insurance companies, finds a natural and perennial habitat. A large portion of the State, indeed more than half its total area, may be recommended for persons suffering from certain diseases. There are many resorts in which mineral waters combine with atmospheric conditions that in course of time may become celebrated. It is not improbable that in ordinary seasons most of the cities and towns of the State are in a fair condition of health. At the same time, the inquiry would be incomplete if it did not point out that the State, by reason of imperfect legislation, and the people, by reason of a natural reluctance toward sanitation, have failed to contribute that factor of stability to health conditions which the interests of commerce demand.

It is clear that a Board of Health is needed in place of the single-headed office now maintained by the State, and that its scope and authority should be commensurate with the great responsibilities which should rightfully come to it. A board, based on principles successfully carried out by such organizations as those of Massachusetts, Michigan and Connecticut, for example, with such changes and modifications as are required to adapt them to the needs of Texas, would be a strong argument to the outside world that the people were laying a strong foundation for their material and permanent advancement. By the operation of a State Board of Health the health conditions of all parts of the great territory could be accurately observed, epidemic diseases most readily controlled, valuable lessons and advice to towns and cities given as to water supplies, sewerage systems, food and drug inspection, disinfection, health ordinances, garbage disposal, etc. Not the least of the duties of the State Board of Health would be the dissemination of a broader and more accurate knowledge of the principles of preventive medicine, so that the people might receive those benefits to which they may fairly lay claim as citizens of the great commonwealth.

IN preparing the foregoing report, useful data have been found in the Biennial Reports of the State Health Officer of Texas; records of the proceedings of the Texas State Medical Association; Texas Medical Journal and Medical News of Texas; publi-

cations of the United States Geological Survey, United States Marine Hospital Service and United States Weather Bureau. Many town and county health officers, physicians and business men of Texas have given the benefit of their information and opinion in interviews and through a large correspondence which has grown out of this investigation. To all those who have assisted in the work, the writer desires to extend his cordial acknowledgments.

Respectfully submitted,

GEORGE A. SOPER, PH.D.

Committee on Sanitary and Climatic Conditions.

New York, Oct. 1, 1901.

THE MANUFACTURING INDUSTRIES OF TEXAS.

PROBABLY no State in the Union is better circumstanced for the production of staple cotton goods than Texas, herself producing nearly 30 per cent. of the cotton crop of the United States, and over 17 per cent. of the total crop of the world. She has in this fact a fundamental advantage unrivaled by any other State or country. Besides this qualification of the possession of unlimited and unfailing supplies of raw material of excellent quality, the State of Texas has a varied and excellent climate, furnishing physical conditions for cotton manufacture perhaps unsurpassed on this continent. Add to these facts a population steadily increasing in size and more rapidly growing in its purchasing capacity, and a system of transportation already offering free intercommunication not only between the different sections of the State, but with the North, East and West, and with seaports possessing established connections with the great cotton goods importing ports of the world, and we have a situation in which one would naturally expect to find Texas one of the largest cotton goods producing States, in proportion to her population, in the Union. In point of fact, however, the actual accomplishments of Texas in this field have been small. The latest statistics obtainable at the time of writing this report contain the following facts and figures:

"Texas has in 1901, 80,145 cotton spindles, against 50,924 in 1900, and she has 2,172 cotton looms this year, against 1,066 last year. Among the large cotton mills of the State are the Dallas Cotton Mills, of Dallas; capital, $275,000; manufacturing ducks. The American Cotton Spinning Company, Denison; capital, $200,000; manufacturing yarns. Galveston City Cotton Mills; capital, $325,000; manufacturing sheetings, drills, ducks, etc. The Gonzales Cotton Mills, of Gonzales; capital, $250,000; manufacturing heavy broom cotton. The Bonham Cotton Mill, of

Bonham; capital, $150,000; manufacturing sheetings. The Corsicana Mill, of Corsicana; capital, $150,000; producing sheetings, twills and duck."

The above statistics are not entirely accurate. For example, the Galveston City Cotton Mills, ostensibly the largest in the State, have been idle for a considerable period, and, so far as your committee can learn, there is no immediate prospect of work being resumed there. On the other hand, some of the manufacturing enterprises, completed or in prospect, are to be reckoned partially as cotton goods producers. Still, after taking into account all that the State has achieved in this branch of textile industry, the fact remains that Texas cotton goods manufacturing is still principally in the future. That it is the destiny of this immense commonwealth to produce largely, both for home and export trade, the finished product for which she produces the raw material in unlimited amounts, it needs no seer to predict. But he would be a daring prophet who ventured to attempt in advance to trace the further progress of the industry. To your committee it seems probable that this progress will be conditioned mainly upon the rapidity with which the population of the State increases and with which her enormous mineral and agricultural resources are taken up.

It is the history of all new and richly endowed territories that manufacturing in general is a delayed branch of human activity. Both immigration and natural increase of population find at first more tempting outlets for their energies in the vast opportunities afforded by soil and mine, and it is not until the number of inhabitants becomes relatively large and stable that those manufactures can flourish which require for their prosecution considerable amounts of highly or moderately skilled labor. The history of Texas seems to furnish no exception to this general rule, and so long as there remains such large opportunities for making money out of her soil, it will be difficult to obtain permanent and contented mill hands at wages which will enable her factories to compete with those of the more thickly settled sections of the country. When, however, the existing conditions in this respect have been outgrown, it may be regarded as certain that Texas, with her cotton, her fuel, her transportation facilities and a large population of high consumptive power, will be found among the leading cotton goods producing States in the Union.

If oil furnishes the results as fuel which are expected of it, then we may hope to see manufacturing industries of all kinds flourish in Texas. She has an abundance of raw material, not only of cotton, but of wool, cereals, lumber, hides, iron and other minerals, and, as the State becomes more thickly settled, will produce in greater abundance. Wool has for some time been successfully manufactured into woolen cloth, and in one mill the cloth is cut up and made into garments. Iron is being manufactured into car-wheels and other articles, wheat is being made into flour, while other manufacturing industries are springing up.

The possibilities in manufacturing are very great. Given plenty of raw material and cheap fuel, with favorable climatic conditions and proper transportation facilities, capital and labor, the two necessary factors in all enterprises, will seek the State freely, and she will move forward with tremendous strides.

D. Le Roy Dresser, *Chairman.*

New York, Nov. 1, 1901.

[In designating the sub-committees, the Chairman of the General Committee appointed two separate committees on manufacturing, one on Cotton Piece Goods Manufacturing, the other on General Manufacturing. The first named consisted of John H. Pynes, chairman; C. H. Kavanaugh, C. T. Root, G. W. Graham. The second consisted of D. Le Roy Dresser, chairman; W. A. Marble, G. C. Batcheller, H. Elmer Gibb.

On studying the subject it became apparent that manufacturing in the State of Texas has been developed so slightly that there is not sufficient data and statistics based on experience to warrant separate reports by these two committees. Therefore, the foregoing general statement has been made in lieu of more definite reports.

The potentialities are great, but they depend upon conditions which are purely local. Therefore, the committees deemed it unwise to attempt to outline those possibilities, as such outline could be merely a prophecy and could not be accepted as being anything more than generalities.]

LABOR CONDITIONS OF TEXAS.

THE conditions of labor in Texas, as in most of the Southern States, are not such as to promote the development of manufacturing industries. The supply is insufficient and erratic. Workers are relatively unskilled and wages are relatively high. During a considerable part of the year factory hands desert the mills for better-paid employment in the harvest fields. Colored laborers are at best very unreliable, and after a short period of desultory industry at good wages are prone to indulge in several weeks' idleness, until their earnings are spent and the pressure of need compels a return to work in the mills.

These erratic elements account for the variations in the labor supply, although not for its persistent deficiency, and, of course, they tend to cause high wages. More constant and powerful factors are the lack of foreign immigration of the artisan class and the attractions offered by the profits to be made from cheap lands. These tend to an insufficient source of labor supply on the one hand and to steady depletion of the artisan class on the other, as well as to a high rate of factory wages, in accord with the fundamental law that cheap and productive land, yielding an easily earned livelihood, promotes land development and retards the development of manufactures.

The working of this law has borne heavily upon the infant manufacturing industries of Texas. The geniality of the climate, the cheapness and fertility of the land and the opportunities of profit from its appreciation in value have caused a steady drain of local capital and labor from urban to rural pursuits. To maintain a labor supply for the new factories it has been necessary to bring factory hands from other sections, and these in turn have gradually abandoned the factories for farm and ranch. Only by frequently importing new hands has the factory quota been passably maintained.

Another element that affects the labor supply is the influence of climate as promotive of industry or indolence. It is an elementary proposition of sociology that where industry is not necessary to subsistence the tendency to indolence is strong. In a continuously mild climate and on a fruitful soil subsistence is very easily provided for, and the demands of necessity upon industry are relatively small in comparison with those imposed by severe climates and soils which yield a food-supply only through unremitting toil. Throughout the South the necessary outlays for clothing, fuel and shelter are relatively small and may be easily met by a very little labor in tilling the soil, which will also yield an ample food supply. These easy conditions of life satisfy a very large class, who have no ambition, regard work as punishment and indolence as a desirable state. It is difficult to induce this class to abandon an easy and independent mode of life for pursuits which demand persistent industry and impose irksome restraints.

These conditions obtain largely among the negro population of the South and materially affect a considerable proportion of the lower classes of the white population in some regions. Because of them it is difficult to procure either a sufficient or a constant supply of factory labor; or to develop a large and necessary class of highly skilled operatives. This difficulty has been severely felt by the infant manufacturing industries of Texas, and to secure and maintain a sufficiency of skilled operatives for cotton mills, sawmills and perhaps other classes it has been found necessary at frequent intervals to import new workers from distant sections. The frequent resort to importation of skilled labor has been compelled by a continuous process of depletion, due to the attraction of various forms of land development, which has led the more enterprising operatives to abandon factory work.

From these causes a considerable percentage of the machinery in many manufacturing plants is operated but fitfully, and the average pro rata output per machine, or other unit of production, is, therefore, relatively small, by reason of enforced idleness, due to lack of operatives. Because of this undue proportion of idle machinery the necessary investment required for a given product is relatively large, and the interest charges borne by the product are correspondingly more pro rata than in the case of plants operated to the fullest capacity.

The skilled labor situation is steadily becoming more satisfactory, however, by reason of the increase in population, the growth of a considerable number of cities, the appreciation of land values and the necessity of varied occupations to provide subsistence. Stable labor conditions, ere long, may be confidently anticipated. When these stable conditions as to the supply of labor shall have been reached by the evolution of a sufficiently large and properly skilled artisan class, Texas will have a very important advantage over other sections in the relatively low cost of living, which inevitably results in correspondingly low prices of labor. It is an unshakable fact that because of climatic and physical reasons the actual necessities of life cost less, and will always cost less, in the Southern than in the Northern States. When Southern manufacturing industries have at command an artisan class of persistent industry and highly developed skill, they will have a decided advantage in labor costs.

Respectfully submitted,

CHARLES B. KNOX, *Chairman,*
GEORGE C. POTTER,
Committee on Labor.

New York, Nov. 1, 1901.

THE TRANSPORTATION AND EXPORT FACILITIES OF TEXAS.

TEXAS, according to the report issued by her State Railroad Commission, has greater mileage of railroad than any other State except Pennsylvania and Illinois, and has kept pace in railroad construction with other portions of the country.

The last published report of the State Railroad Commission shows that on June 30, 1900, there were 9,867.07 miles of railroad in operation in Texas. This was a net increase of 1,212.92 miles over June 30, 1891, at the time the Railroad Commission was established.

In 1891 there were eleven railroad properties in Texas in the hands of receivers, the mileage of these roads aggregating 3,355.57 miles, or about 38¾ per cent. of the total mileage then in operation in the State; while in 1900 only one railroad in Texas was in the hands of a receiver. This road was only twenty miles long and represented less than one-fifth of one per cent. of the total mileage of the State.

The people of the State in 1890 adopted an amendment to the Constitution, which reads as follows:

> "*Section* 2. Railroads heretofore constructed, or which "may hereafter be constructed in this State, are hereby de- "clared public highways and railroad companies common "carriers. The Legislature shall pass laws to regulate railroad "freight and passenger tariffs, to correct abuses and prevent "unjust discrimination and extortion in rates of freight and "passenger tariffs on railroads in this State, and enforce the "same by adequate penalties, and to further accomplish these "objects and purposes may provide and establish all requisite "means and agencies invested with such powers as may be "deemed adequate and advisable."

Following this, the Legislature of the State on April 3, 1891, passed an act establishing a Railroad Commission for the State "whereby discrimination and extortion in railroad charges may be prevented and reasonable freight and passenger tariffs may be established."

The duties and general powers of the Railroad Commission are set forth in the following section:

> "The power is hereby vested in the Railroad Commission "of Texas, and it is hereby made its duty to adopt all necessary "rates, charges and regulations to govern and regulate freight "and passenger tariffs, the power to correct abuses and to pre- "vent discrimination and extortion in the rates of freight and "passenger tariffs on the different railroads in this State, and "to enforce the same by having the penalties inflicted as by "this act prescribed through proper courts having juris- "diction."

Since that time the State Railroad Commission has issued annual reports which constitute a very complete record of the railroads of Texas, covering all the details of operation.

These reports show that the cost of transportation of freight within the State has been very much reduced since the Railroad Commission was organized, the Commission claiming that the net revenues of the railroads have been considerably increased, ascribing as the reason therefor the increased amount of transportation and the position of the Commission taken in regard to cutting of rates and the allowance of rebates, both of which practices the Commission claims to have minimized, and in most cases to have stopped altogether.

The last report of the State Railroad Commission cites from the report of the Interstate Commerce Commission to show that for the year ending June 30, 1891, the average revenue to railroads throughout the United States was 8.95 mills per ton per mile, while in 1899 it was 7.24 mills, a decline of 19.1 per cent. This report gives the figures for Texas for 1891 as 14.03 mills per ton per mile, and in 1899 as 10.73 mills, the decline being equal to 23.5 per cent.

There has been considerable friction between the Railroad Commission and the railroads of the State, resulting in litigations,

some of which have been carried to the United States Courts. If we were to attempt to go into the merits of these controversies this report would be burdened with statements, pro and con, which could not produce results and which could not change the fact that the Railroad Commission still exists with all its powers, or alter the sentiment of the majority which is favorable to retaining in the Commission's hands the present power rather than curtailing it. This majority, however, comes largely from the agricultural class. There is a large and growing class, principally the men of affairs of the commercial centres, who believe that placing the rate-making power in the hands of even as eminent gentlemen as have occupied the positions of Commissioners, has been detrimental to the State. The repeated instances wherein the rates and rulings of the Commission have threatened established business interests with bankruptcy, and the appeals that have been made to the Federal Courts, have tended to stimulate a feeling that Texas, like other comparatively new States, has lost and must continue to lose rather than gain by antagonizing capital.

The appeals to the Federal Courts have invariably brought relief, but never to the extent of denying the right of the State to delegate to a commission the rate-making power. The pressure upon the roads, however, has always been relieved by the Federal Courts, whose mandates have been in the line that rates should be reasonable, just and without discrimination.

The rulings of the Commission in relation to the compressing of cotton have often been deemed unjust to the lines engaged in its transportation, but happily the Federal Court has also relieved this situation.

It is to be regretted that in the interest of the energetic and progressive business interests of the State, the Legislature should not direct the Commission along lines more in harmony with those of the great majority of States where transportation interests are supervised by the railroad commissions by allowing the roads the rate-making power, but insisting at the same time that the rates shall always be reasonable, just and without discrimination as between individuals or places.

The sentiment in most States is favorable to railroad commissions. This condition is accepted, but we consider it a grave

question whether a commission, vested with the rate-making power, as the one which exists in Texas, is not detrimental to not only the railroads, but the State at large and all vested interests therein.

When it is asserted that Texas has more railroad mileage than any other State, except Pennsylvania and Illinois, it must not be forgotten that Texas has an enormous area, and that this general statement of mileage does not convey any idea of the conditions in the State. For instance, Texas has 265,780 square miles of territory. This is more than the total square miles of territory within the States of New York, Pennsylvania, Ohio, Indiana, Maine, Vermont, New Hampshire, Massachusetts, New Jersey, Connecticut, Delaware and Rhode Island, which twelve States have only 258,635 square miles of territory, and which, generally speaking, may be said to be the most populous and richest States in the Union.

It must also be remembered that the western half of the State is not to any great extent susceptible of cultivation, except a small portion that can be irrigated. It is dry, sterile and unproductive, yielding little returns, except when devoted to cattle and sheep industries.

Taking as a basis 100 square miles of territory throughout the entire United States, the average population for each 100 square miles is 25,650, while the mileage of railroads per each 100 square miles is 6.37 miles. Taking Texas by itself on the same basis, there is for each 100 square miles a population of 11,470, while for the same division of territory there are 3.73 miles of railroad.

Taking the earning capacity of roads in Texas, as compared with the United States, using as the basis of comparison 100 miles of railroad which, in Texas, would give a population of 30,347 per such 100 miles of railroad, the earnings are $466,600.

Taking the entire United States on the same basis of 100 miles of railroad, we find a population of 39,537 per 100 miles of railroad, with earnings of $700,500 for each 100 miles.

In Texas the total capitalization of the roads is as follows:

TEXAS RAILROAD STATISTICS.

Capitalization:		
Bonds, etc	$262,614,567	
Stocks	247,268,642	
Total		$509,883,209
Per mile, bonds, etc	$23,906	
Per mile, stocks	22,509	
Per mile total		$46,415
Miles of Line (1899)		9,778
Employees' Wages and Services:		
Total number (1899)		41,502
Number per 100 miles of line		365
Amount paid for services		$22,045,446
Gross Earnings from Operation		53,048,923
Per mile of line		4,666
Expenditures—Operation (70.02 per cent. of gross earnings):		
Wages and services	$22,045,446	
Other operating outlays	15,101,976	
Total operation		$37,147,422
Interest:		
On bonds	$12,212,394	
On other securities	362,379	
Total interest		$12,574,773
Dividends		265,487
Other charges, rentals, etc.		3,666,008
Total expenditures		$53,653,690

Traffic of the roads in Texas, as compared with traffic in the entire United States, is as follows:

TRAFFIC.

	Texas and Louisiana.	*United States.*
Tons of freight carried for each mile of line	328,972	659,565
Average tons per train	169.16	243.52
Number passengers per mile of line	33,913	77,821
Passenger earnings per mile of line	$1,021.78	$1,927.94
Freight earnings per mile of line	3,551.94	4,895.09

PROFITS.

Capital stock which received no dividend:

1890,	per	cent.	of	total,	99.99	1895,	per	cent.	of	total, 99.97
1891	"	"	"	"	99.99	1896	"	"	"	" 99.31
1892	"	"	"	"	99.98	1897	"	"	"	" 99.27
1893	"	"	"	"	99.99	1898	"	"	"	" 93.17
1894	"	"	"	"	97.84	1899	"	"	"	" 91.24

Interest, 1899.

On Total Funded Debt.	*Per Ct.*	*On Bonds.*	*Per Ct.*
16.22 p.c. of total earned,	0	7.21 p.c. of total earned,	0
1.36 " " "	1 to 2	1.31 " " "	1 to 2
1.94 " " "	2 to 3	2.24 " " "	2 to 3
20.57 " " "	3 to 4	20.34 " " "	3 to 4
29.44 " " "	4 to 5	34.05 " " "	4 to 5
13.94 " " "	5 to 6	15.90 " " "	5 to 6
11.52 " " "	6 to 7	13.16 " " "	6 to 7
2.72 " " "	7 to 8	3.14 " " "	7 to 8
2.29 " " "	9 to 10	2.65 " " "	9 to 10

The possibilities of railroad development in Texas, like the possibilities of the development in other lines in that State if

properly encouraged and protected, are beyond the power of any man to predict. They are startling when one stops to consider the conditions which surround that State and its relation to other fertile States and Territories naturally tributary thereto.

Several of its railroads already connect with the railroads that have been built in Mexico, and further development in Mexico must, in the very nature of the surroundings, favorably affect the traffic of these connecting roads in Texas.

One more system in Texas is arranging to extend to the Mexican border, and within a comparatively short period of time there will probably be other outlets for Mexico through this great State.

Texas naturally is the route through which a large part of the products of Southern California going eastward and all going to the Gulf ports must pass, and as California increases in population and in producing capacity proportionate benefits must accrue to Texas railroads.

Between California and Texas there are the intervening territories of Arizona and New Mexico, rich in minerals, which have by no means been fully developed.

Contiguous to Texas on the north are Southwestern Arkansas, Indian Territory and Oklahoma, while north of Indian Territory and Oklahoma is the populous and rich agricultural State of Kansas. To the northwest are Colorado and Utah, rich in mines and in cattle, while just north of Colorado is Wyoming. Again, north of Kansas there is Nebraska.

The natural route to the Gulf coast for such products of these States and Territories, whether in agriculture, minerals, cattle, sheep or manufactured products of any and every kind which may be developed within their borders, destined to the coast, is either through Texas to its outports or through Louisiana to New Orleans.

Galveston is the principal port of Texas, as New Orleans is of Louisiana. These naturally are rival ports, and will always continue to be, and each, therefore, naturally and earnestly strives for its proportion of the increase of traffic destined to the coast which comes from the increased development which is rapidly taking place in the trans-Mississippi and trans-Missouri

sections of the United States. Both will benefit, whether equally or not, of course, remains to be seen, but whether equally or not, both will benefit very largely.

As the country west of the Mississippi and Missouri rivers is settled and developed, the traffic to the southwestern Gulf ports will become greater.

Then, too, the possibilities of the development of Texas itself must be considered. It has 265,780 square miles of territory, about one-half of which is fertile soil capable of producing almost everything that grows in other parts of the country, is rich in mineral resources, in timber, cattle and sheep, looks forward naturally to a great increase in manufactured products, for which it has an abundance of raw material of many kinds, is capable of supporting a vast population, and, taken all in all, is probably one of the States of greatest possibilities within the limits of the entire United States.

There also must be taken into account the probability of great increase in the importations. This is a natural sequence of development. As Texas and the country contiguous and adjacent thereto develop and grow richer, the luxuries of life which are now principally imported through the eastern gateways will be brought in to supply that vast section through the ports of Louisiana and Texas. There are now fleets of large vessels sailing from Galveston and Port Arthur and Sabine Pass laden with Texas products, which, when they come to Texas for their cargoes, now come largely in ballast, but which, as the purchasing power of that section of the United States increases, will bring valuable cargoes from all parts of the world.

Nearly all the heavier exports and imports of Texas flow through Galveston. What this trade will amount to as the State becomes a larger producer and the country naturally tributary to Texas is developed, is beyond the power of any man to predict. It is, undoubtedly, destined to become enormous.

Galveston, for the fiscal year closing June 30, 1901, exported products, natural and manufactured, to the value of $101,962,792. The principal items were:

Cotton, 1,699,197 bales, valued at $82,093,982.

Cottonseed, cake and meal, 481,749,531 pounds, valued at $4,861,043.

Cottonseed oil, 5,004,747 gallons, valued at $1,518,127.
Wheat, 16,163,224 bushels, valued at $10,310,613.
Lumber, 39,960,000 feet, valued at $660,665.
Ores and minerals, 12,698,857 pounds, valued at $648,789.
Live stock, valued at $490,640.

These were transported in 330 vessels, which cleared from Galveston in the foreign trade, with a total of 690,032 tons (net).

These vessels represented 36 lines, 10 running to Great Britain, the Continent, the Mediterranean, Denmark, Cuba, Mexico, the West Indies, South America and China.

These exports represent about one-fifteenth of the total exports of the United States, and place this port in the second rank as a cotton port, in the first rank as a cottonseed, cake and meal exporting port, and the second place as a wheat exporting port.

The growth of the export of cereals has been phenomenal. In 1892 Galveston exported only 847,772 bushels of wheat, and this exportation has grown steadily, except in the years 1894, 1895 and 1896 when there were short wheat crops, until it has reached its present dimensions of 16,163,224 bushels. The growth in corn has been even more phenomenal. In 1892 Galveston exported only 49,185 bushels of corn, and in 1900 8,136,275 bushels.

Texas produced in 1892 cotton to the extent of 2,406,108 bales; for the year just ended, 3,508,286 bales, and the growth of the shipment of cotton in Galveston has been proportionate.

Sabine Pass, which includes Port Arthur, has attracted attention of recent years, by reason of the fact that it has become the terminal of the railroad system leading from Kansas City almost due south to that place. The exports from Sabine Pass, including Port Arthur, for the year ending June 30, 1901, were 51,976 tons, valued at $2,333,669. Sabine Pass and Port Arthur are, it seems to your committee, destined to grow, as the facilities leading there are improved, and as the country tapped by the railways entering that port is settled. Galveston, however, is, as we have said, the principal port, and has all the

facilities and advantages of an established city, with fine terminal properties and a deep-water channel.

Respectfully submitted,

WILLIAM R. CORWINE,
Chairman,
HENRY B. COSGROVE,
CASSIUS M. WICKER,
Committee on Transportation and Export Facilities.

New York, Nov. 1, 1901.

THE BANKS AND FINANCIAL INTERESTS OF TEXAS.

YOUR committee on banking beg leave to report as follows: It gives us great pleasure to state we found from the best information obtainable the financial condition of the State, counties and cities in every way very satisfactory. Out of about 246 counties we found 166 have in successful operation 297 national banks, 168 private banks, 7 savings banks and 12 loan companies; total, 484.

The 297 national banks have a paid-up capital of approximately.....	$27,257,190.00
Surplus and undivided profits.....	10,485,167.00
Deposits	100,305,046.00
Loans and discounts.....	77,541,019.00

After deducting the 25 per cent. for reserve, which is required under the National Banking Law, as applied to New York City, leaving about $36,082,873, an amount almost equal to the entire capital and surplus, which is, no doubt, represented by cash on hand or carefully and securely invested in good securities.

We also find in addition to the above figures that the State has 168 private banks having approximately the following capital: $4,582,000; individual responsibility, $7,000,000.

This shows a condition which we doubt if any State can equal; showing conclusively the careful manner in which the finances are handled and reflects great credit upon the banking officials.

We were very much pleased with the character of the officers and clerks; in every instance we found them highly cultured gentlemen. The banking houses are excellently equipped, equal-

ing those of any similar institutions we have ever had the pleasure of visiting. Many of these banking offices were as perfect in appointments as any found in our home city. Your committee cannot make any suggestions that would in any way improve the conditions as we found them along the lines of regular banking.

Your committee begs to point out the desirability of action by the Legislature of the State of Texas looking toward the encouragement of savings banks within that State, as a very important means of developing its resources, as well as promoting the prosperity of its working classes.

The great utility of savings bank capital has been very little appreciated by most of the Southern States. The savings banks are few, and the deposits relatively small. Texas in particular is far behind most of the others. It ranks among the lowest of all the States in the Union in this provision for encouraging thrift and economy and utilizing the great volume of home capital profitably.

It would be superfluous to enlarge upon the advantages to individuals resulting from the habits of economy and saving which have been greatly promoted by the savings bank system in many of the Northern States. It is quite pertinent, however, to emphasize the far more important political and economic effects which result from the existence of a numerous class with savings invested in securities based upon local lands and stability of government. The most striking example is that of France, in its payment of the enormous German war indemnity exacted from it after the Franco-Prussian War. Never before in history had a nation been able to anticipate its obligations as did the French nation in the pre-payment of that heavy burden. Because of this nearly all the small land owners in France became stockholders in the finances of the State. That fact converted them from turbulent agitators into conservative citizens, who at a later date prevented the overthrow of the Republic, because their interest in the land, as represented by their investment in government securities, led them to uphold the Government.

The same result has been frequently manifested in the case of harmful political and economic agitations in this country,

notably when the great savings banks deposits of thousands of working people, invested in securities based upon land, led them to oppose and overthrow the fallacies which otherwise would have prevailed, to the great harm of all capital.

The more direct effect of the savings bank system is to provide a large body of home capital, loanable at small rates of interest, and always available for sound business purposes directed to the development of the country and based upon its land values.

This is the great need of Texas. It now borrows great sums of money every year from Northern banks to move its cotton crop. Its merchants are compelled to buy on long time in order to give the long credit demanded by the farmers and land owners. The savings-bank system would ere long abolish this expensive and wasteful method and replace it by true economic methods that would not only multiply home capital, but keep it at home and prosper upon the profit of its use, in place of paying a profit to other States from which it is now necessary to borrow heavily.

We will give one example by way of explanation. A savings bank in New York City, established in 1848, had on hand as follows:

January 1st, 1849, total deposits.....	$15,845.04
January 1st, 1901, total deposits.....	16,000,000.00

Owned by over 22,000 depositors with over $9,000,000 loaned on bond and mortgage.

The savings banks in New York State, held on June 30, 1901, $1,105,076,764.67, owned by 2,129,790 depositors.

Amounts deposited during year ending June 30, 1901, were.....	$276,317,181.17
Amounts withdrawn during the year ending June 30, 1901.....	243,171,637.46
Making a net increase in deposits for the year of.....	33,145,543.71
Amount of interest credited to depositors for the year	32,606,746.78

At least 50 per cent. of these deposits are invested in bonds and mortgages on real estate in the State of New York. We give these figures to show how rapidly the savings of the poor increase. Please allow us to call your special attention to the

interest credited to the depositors during the year ending June 30, 1901.

Your committee would also suggest that the Legislature of Texas take under careful consideration the granting of charters to loan and trust companies, on lines similar to those created under our laws. These institutions are intended to act as savings banks with enlarged powers. They also lend money on real estate, which national banks cannot do. These institutions would seek farmers and builders as borrowers, and in this way help to provide cheap money, so much desired by the people.

Texas has been wise beyond other States in its munificent provision for the education of its children. Why not provide by the same wise legislation places where the poor can deposit their small savings, thereby encouraging economy, which can only end in prosperity and happiness; always remembering that the laws must place around these institutions every possible safeguard to protect the depositors, and such wise provision for taxing trust companies that they may be compelled to pay their just proportion of the State and local taxes?

Your committee begs to urge one other thought upon the people of the Lone Star State—the importance of rebuilding their grand seaport, Galveston. Nothing would result in greater profit to the great commonwealth than providing Galveston with some positive means of placing her beyond disaster from storm. As our beautiful harbor of New York is absolutely necessary to New York State, so is the port of Galveston to Texas. Help build her up. As she grows so will the State increase in wealth, prosperity and happiness.

Respectfully submitted,

D. S. Ramsay,
Chairman,

Frank L. Sheldon,
Wm. G. Hoople,
Committee.

PUBLIC EDUCATIONAL INSTITUTIONS IN TEXAS.

I.
GENERAL EDUCATIONAL ASPECTS.

DURING the two weeks spent in traveling through all of the principal cities and most of the large towns of Texas, on the merchants' special train from New York, the members of your committee personally visited both the white and colored schools of all parts of the State. They were surprised to find the schoolhouses large and commodious, and in many instances vying with those of our Northern States for convenience and size and number of pupils. The white schools are kept entirely distinct from the colored schools, and, however this may be in the North, it is evident that in the South this is a very wise and important arrangement. The colored schools have generally teachers of their own color, although in some instances white teachers were found in the colored schools. In the white schools white teachers only are allowed.

THE HIGH GRADE OF SCHOLARSHIP AND GENERAL ADVANCEMENT.

WHAT struck your committee most surprisingly during their visit was the high state of advancement noticed in many of these schools, so that as regards scholarship and education in nearly every branch the schools throughout Texas compared very favorably with the schools of our Northern States. It is also evident that the general advancement is far more rapid in Texas than

in the North, so that it seems not at all improbable that, with their magnificent school fund, they may soon even surpass in excellence our schools in the North. The State School Fund of Texas is very large, and, in fact, there is no other State in the Union that can compare with it. The amount of this enormous school fund, as taken from the official and authoritative State Department of Education, approximates $42,000,000. Of this amount about one-half is invested in bonds and other income-bearing investments and about one-half is represented by land owned by the School Board, an area of about twenty millions of acres, exceeding that of the entire State of Pennsylvania.

Texans have every reason to be proud of the immense school fund, which guarantees free education to every boy and girl throughout the State. It might be well, as it seems to us, if during childhood education were compulsory in Texas, as it is now in the Eastern and Northern States. Possibly, owing to the fact that children mature at an earlier age in the South than in the North, the limit should be from 7 to 12 instead of from 12 to 14, as it is in the North. But we doubt not this will soon be the case, and it well may be, for she has a fund for this purpose.

THE IMMENSE FIELD.

WE found the School Board and the trustees and members of the school committees always ready to assist and aid us in our endeavors to get at the educational status of the State. They are deservedly proud of their fine showing in regard to school-houses, the vast array of good school-teachers and the growing interest displayed by all those connected with education throughout the State. Indeed, it is not too much to say that the school fund of the Lone Star State is greater in proportion even to the size of the State than that of any other State of the Union, and it must be remembered that the State of Texas is a vast empire in itself, larger than all New England with New York and Pennsylvania combined.

Daniel Webster, in his great speech of the 7th of March, 1850, by a bold figure of speech, speaking of Texas, declared it "so vast that a bird could not fly over it in a week." This State alone is five times as large as the entire British Isles, and equal to thirty-

four States, each the size of Massachusetts. It is larger than the whole of France, and, incredible as it may seem, it is nevertheless true that if the entire living population of the globe—fourteen hundred million—was divided into families of five persons each all those families could be accommodated in the present State of Texas—not after the manner of our city dwellings, crowding a house or two houses upon a lot 25x100 feet, but allowing each family a house lot of one-half an acre, and then there would be a surplus of more than seventy millions of family lots untaken.

The mind is almost bewildered in considering so large a question as the educational status and progress over so immense a territory.

When the party of the Merchants' Association was being organized to visit Texas we were quite doubtful of the trip at first, fearing the trials, tribulations, hardships and dangers of a journey through a wilderness inhabited, as some reported, only by Texas steers and outlaws. We half expected to be "held up," as they term it out West.

We have been greatly surprised by Texas and her people, we must admit, and most agreeably. Most joyously so, indeed. The Lone Star State is a wonder; a marvel. Its possibilities are simply illimitable; its people the most courteous and hospitable we ever met, and they grew into our hearts more each day as we met them.

As the committee of education of our party we have been making a special study along the educational line. It scarcely expresses the fact to say that we were astounded when we learned that the State had $4,000,000 in the public school treasury, a public school fund from the interest of which, supplemented by a small taxation, it supports its schools, and in addition many millions of acres of land belonging to this same school fund, rented out for pasture lands, and yearly becoming more valuable. We find that Texas is ahead of any State in the Union in provision for her public schools. We found not only at Austin a splendid State University, but in every city and town we have seen school buildings, handsome, commodious and equipped with all the apparatus necessary to the methods of modern education. We have met Texas educators and found them to be learned and refined gentle-

men, up to date in all things. Texas has great reason to be proud of her State for many things, but especially for her educational facilities, and we shall open the eyes of the Northern people when we tell them of these things.

II.

THE ATHENS OF TEXAS.

WACO has been called the Athens of Texas, and with her we will begin. The history of her public free schools is an interesting study, more than any other department of industry, showing the growth of the city from 1882, the year the system was organized, to the present time. Beginning with three small houses, ten rooms and 200 seats, the schools have reached proportions truly grand, compared with the start made nineteen years ago. There are now school buildings, sites and furniture valued at $283,000 and seatings for 3,500 pupils, and still there is not room enough to accommodate the school population. So great is the pressure that the board has applied to the City Council for an issue of $60,000 in school bonds in order to add twenty-one to the sixty-six rooms, and that will, it is believed, relieve the pressure for at least one year ahead of the present date, after which other rooms will be necessary, for the school population grows marvelously and never halts.

Of the entire revenues of the city, amounting to $200,000, the maintenance of the public schools requires 25 per cent. The city schools cost the taxpayers $50,000 a year, and, nevertheless, they fall short of meeting the demand for free education.

Superintendent Gallagher submitted a report for the year ending June 30, 1884, showing that at that time the city sustained two schools for white and three for colored pupils, and that the total value of the school property that year was $10,300. The number of white teachers employed in 1884 was eleven and of colored teachers seven. The schools cost that year $12,150. The year 1885 began with lessening prejudices against the public school and prejudice had largely disappeared before the term of 1886 began. From the latter year the improvement in the public schools was rapid and astonishing.

Superintendent Lattimore's report shows an enrollment for the current year of 5,000 pupils, 53 white and 13 colored teachers and school property valued at not much under $300,000. The report of Prof. Lattimore now shows vast improvement in the courses of study, in the text books in use, and in all the facilities adopted for the regulation and maintenance of the schools and for the comfort of the teachers and the children.

Waco pays $50,000 a year for public education, which is one-fourth part of its revenues, and the City Council is preparing to increase that expenditure, because the school population is not yet provided for as the intelligent and liberal taxpayers think should be the case.

In addition to the public free schools Waco is liberally provided with other educational institutions. There are two business colleges, with an aggregate enrollment of 800 pupils, and several select schools in which the young people are trained for academies and universities. There are two universities in Waco, both of which are patronized by distant States as well as Texas. Baylor University, according to the catalogue about to be issued, has an enrollment of 912 pupils. It is a co-educational university, and the sexes are about equally represented in the list. Its correlated schools are Howard Payne College at Brownwood, Decatur College at Decatur, Burleson College at Greenville, East Texas Institute at Rusk and Baylor Female College at Belton. Nearly fifty high schools and private academies are affiliated with Baylor University, some of the most important of which are the Ball High School of Galveston, Houston High School of Houston, Thomas Arnold High School and the Bell Academy of Bell County.

Important recent improvements in the Baylor University are a beautiful two-story brick building, used as a dining hall and as a hall of fine arts, an excellent engine-house and four brick buildings used as dormitories for the boys. The faculty has been strengthened by the addition of several new educators, who represent the best training in their specialties in the world. The regents are preparing to build a science hall which will embody the best ideas of the times. The university has lately come into possession of a mammoth building which is being equipped for a gymnasium.

Add-Ran University, also co-educational, located in North Waco, is a brick building four stories high, on a campus of twenty acres, which has lately been improved, with shade trees and cement walks. Add-Ran University was removed from Thorpe Springs to Waco in December, 1895. Recently a dormitory was built for the young ladies. The property is valued at $150,000. It has 250 pupils, male and female, on its rolls.

Paul Quinn College, in East Waco, is an institution for colored people, taught by colored teachers and supported by colored patronage. It is a handsome brick building, with a campus of fifteen acres. It is not only an excellent academy for mental training, but it has an industrial department, in which its pupils are taught useful trades. It has on its rolls 300 pupils.

III.
HOUSTON AND GALVESTON.

WE did not see as much of the public schools at Houston as we wished, but what we did see was excellent, and we are informed that the public and private schools in that city are fully up to the mark, and will equal, as regards scholarship and thoroughness, any schools in the State. Her schoolhouses are well built and her teachers are among the best.

We visited the city of Galveston, which, on September 8, 1900, was prostrated by a storm unparalleled in the history of the country for violence and destructiveness. In common with practically every structure in the city the school buildings suffered severe damage and were rendered unfit for use. In this emergency some friends of the University of Texas came to the assistance of the board and advanced funds for such temporary repairs as would permit the early resumption of school work. The total destruction by the storm of all property appalled us, and we were glad to remember that in common with all the North the Merchants' Association sent timely and substantial relief to the sufferers. The city is, however, rapidly recovering and will soon be again one of our most prosperous cities.

IV.
SAN ANTONIO AND HER SCHOOLS.

SAN ANTONIO is not only the largest city in the State of Texas, but in proportion to its population it is one of the most active and vigorous, and its schools are in full keeping with this fact. Although a city of nearly 70,000 inhabitants, the superb quality and number of fine buildings would indicate a city of even much larger dimensions. The public buildings of a city are justly considered as an index of its character, especially in an educational way, and it will be seen that those of San Antonio speak eloquently and well for the taste and ability of a people who have full faith in the future.

The city is perhaps best known by the ancient mission of San Antonio de Valero, known the world over as "The Alamo," founded in 1716, and for many years used as a fort. As the scene of Santa Anna's massacre of the Texan patriots in 1836, it has a world-wide fame, and is in the most populous part of the city itself. A picture of the New Yorkers and their friends of the Texan delegations was taken, with this old mission in the background. Each of these old San Antonio missions has a noted history, and it is almost a part of a liberal education to know it. The first, or Mission Concepcion, founded in 1716, was the scene of a battle between the Mexican and Texan troops in 1835; the second, or Mission San José de Aguayo, founded in 1720, and the third, or San Juan Capistrano, founded in 1716, were the rendezvous of the Texans in 1835, just previous to their capture of San Antonio. These are all noted old buildings, and during his frequent trips in the South the writer has visited them many times. The fine old Cathedral of San Fernando is located in the very heart of the town. They are all well worthy of a visit from those who are spending the summer in the Sunny South, for truly these old missions are veritable histories preserved in stone and mortar that never fail to inspire the thoughtful observer.

San Antonio has the finest schools and schoolhouses in the State, which is saying a good deal, for there are many splendid

public educational edifices through the State than can scarcely be surpassed anywhere. She has more than forty schools, public and private, several of which were visited by your committee. For the sake of those who may desire to correspond with any of these high-class schools and colleges throughout the State we subjoin the following list of fifty of the leading Texan educational institutions, giving the post-office address and the Church proclivities of each:

NAME.	CHURCH.	Post Office Address.
St. Mary's Female Academy	Catholic	Austin
Bickler Academy	None	Austin
Baylor Female College	Baptist	Belton
Carlton Female College	None	Bonham
Evangelical Lutheran College	Lutheran	Brenham
Daniel Baker College	Presbyterian	Brownwood
Howard Payne College	Baptist	Brownwood
Henry College	None	Campbell
Industrial Female School	Roman Catholic	Castroville
Chappell Hill Female College	Methodist E., South.	Chappell Hill
East Texas Normal College	None	Commerce
Academy of the Sacred Heart	None	Corsicana
Mrs. Miller's Female Seminary	None	Corsicana
North Texas Normal	None	Denton
Fort Worth University	Methodist Episcopal	Fort Worth
St. Ignatius Academy		Fort Worth
St. Mary's University	Catholic	Galveston
Culberson Select School	None	Gillsboro
Massey College	None	Houston

NAME.	CHURCH.	Postoffice Address.
Houston Academy.	None	Houston
Alexander Institute	Methodist E., South.	Jacksonville
Southeast Texas College	None	Jasper
Randolph College	None	Lancaster
Laredo Seminary	Methodist E., South.	Laredo
Patton Female Seminary	None	Oak Cliff
East Texas Baptist Institute	Baptist	Rusk
Mrs. Mulholland's Female School.	None	San Antonio
Peacock's School	None	San Antonio
St Mary's Female Hall	Protestant Episcopal.	San Antonio
St. Mary's College	Roman Catholic	San Antonio
San Antonio Academy .	None	San Antonio
S. A. Female College	Methodist E., South.	San Antonio
Ursaline Female Academy	No data	San Antonio
Coronal Institute	Methodist E., South.	San Marcos
Thos. Arnold High School	None	Salado
North Texas Female College	Methodist E., South.	Sherman
Sherman Private School	None	Sherman
John Tarleton College	None	Stephenville
Columbia College	None	Van Alstyne
Methodist Orphanage	Methodist E., South.	Waco
Douglas-Schuler School	None	Waco
Texas Female Seminary	Cumberland Pres.	Weatherford
Weatherford College	Methodist E., South.	Weatherford
Grayson College	None	Whitewright
Male and Female College	None	Willis
Southwestern University	Methodist E., South.	Georgetown
Austin College	Presbyterian	Sherman
Trinity University	Cumberland Pres.	Tehuacana
Add-Ran University	Disciples of Christ.	Waco
Baylor University	Baptist	Waco

COLORED SCHOOLS.

NAME.	CHURCH.	Post Office Address.
Tillotson College	Congregational	Austin
Mary Allen Female Seminary	Presbyterian	Crockett
Wiley University	Methodist Episcopal.	Marshall
Bishop College	Baptist	Marshall
Guadalupe College	Baptist	Seguin
Paul Quinn College	Methodist Episcopal .	Waco

To Hon. George W. Brackenridge, of San Antonio, is due, perhaps, more than to any other one man, the advancement of

education in the Lone Star State. As President of the Board of Regents of the University of Texas, and chairman of the Committee on Lands, as well as by his large gifts in various directions, he has earned the thanks of every true Texan. It may be added that the State of Texas donated to the State University by the Constitution of 1876, one million acres of western lands, and by the act of 1883 added another million acres, making a total of two million acres to this university alone. A State which can afford to make such magnificent gifts truly deserves our commendation, and future generations will reap a rich reward in an educational way.

V.

WHAT THE STATE UNIVERSITY HAS DONE AND IS DOING.

IN considering this magnificent gift of the State, the fact should be considered that the University of Texas has accomplished a great deal during the past two years towards improving the public schools. By establishing and equipping a school of pedagogy for the special training of teachers, by opening all its courses to teachers twenty-one years old, free from regulations governing candidates for degrees, by conducting summer schools for teachers who are unable to attend the regular sessions of the university, by systematic communication with the teachers through circular-letters and private correspondence and by sending members of its faculty to visit, inspect, address and affiliate the State high schools, the university has shown itself fully alive to its duty and its opportunity as the head of the public school system of Texas. But it has been greatly hindered in its work by lack of funds, which this great gift is intended to supply. The improvement of the public schools depends largely on thoroughly educated, broad-minded teachers. This is so evident and so palpable that it was felt that special provision should be made to accomplish this result.

In fact, this University of Texas is a component part of "The General System of Education" demanded by the fathers of the Republic and the State more than half a century ago. Since its

organization, in 1883, it has continued to develop in the direction indicated by its founders. It is gratifying to know this, as the past year has been marked by more than usual growth and development.

As further showing the importance of this great University of Texas, it should be remembered that over thirty public and private schools have been affiliated with the university.

These public high schools are located in Abilene, Beaumont, Beeville, Bowie, Bryan, Cameron, Carthage, Cleburne, Dublin, Gatesville, Greenville, Henderson, Henrietta, Honey Grove, Kaufman, Kerrville, Llano, Marshall, Mineola, San Angelo, San Saba, Sherman, Terrell, Troupe and Tyler.

The private schools are as follows: Bruce Academy, Athens; Ferris Institute, Ferris; Henry College, Campbell; Woll School, Honey Grove, and Whitis Avenue School, at Austin.

VI.

SCHOOLS FOR THE BLIND AND FOR THE DEAF AND DUMB.

TEXAS has a so-called "Institution for the Blind." This school has a beautiful location in the city of Austin. Its fine buildings present an attractive appearance, and all are arranged with reference to the comfort of the inmates. The State has appropriated liberally for the new buildings and the patronage of the school has continued to increase. The Lone Star State pays the entire cost of the maintenance of this school, and furnishes a home and a place where all the unfortunate blind children in the State of Texas can receive such training as will fit them for useful and happy lives after manhood and womanhood are attained.

It also has a fine and commodious "Institution for the Deaf and Dumb," located in a beautiful spot in the southern part of the city of Austin, across the Colorado River, on a hill overlooking the surrounding country. The number and arrangement of the different buildings belonging to the school were such as to astound

your committee, and seemed amply adequate for all the demands that could be made upon them. What State in the Union can show a better record?

VII.

THE SAM HOUSTON INSTITUTE.

THE Sam Houston Normal Institute for the training of teachers is located in the eastern part of the State, in the town of Huntsville, Walker County. The place is rich in historic associations connected with the early days of Texas as a State. It was in Huntsville that Sam Houston spent his last days; it is here his remains lie buried, and the school fitly received his name in honor of the hero of San Jacinto.

During the twenty-one years of its existence this noted school has enrolled more than six thousand students, and has sent out nearly fifteen hundred graduates. A large percentage of the latter class are now among the most active teachers of the State, while many of the non-graduates have done good work in the schools of the State. It is an institution of which any State might well be proud.

VIII.

THE SCHOOLS AT SHERMAN.

THE North Texas Female College and Conservatory of Music at Sherman is particularly worthy of mention, and will compare favorably with any institution of its kind in the North—Boston not excepted. The curriculum adopted is substantially the course recommended by the Board of Education, Methodist Episcopal Church, South. It is divided into seven courses: Mathematics, English, Science, Latin, Greek, German and French. Each class recites five times a week in each study,

except reading and literature. If you wish a daughter well and thoroughly educated, send her to North Texas College and there will be no mistake. We were beautifully entertained at this college by the President, Mrs. Key, and were shown how perfectly all departments were carried on for the best interests of the pupils.

Physical culture is taught in the most improved form by a thoroughly competent lady instructor. The movements are selected, not for mere show and intricacy, but as a healthful exercise, to give tone and strength to the muscles of the body and grace to deportment. Both the German and Swedish methods are used, the former for elegance, the latter for strength.

Sherman is peculiarly fortunate in her schools, both public and private, and it was a great pleasure for your chairman to visit them in company with such good judges of what a school ought to be as Mr. P. W. Horn, the genial superintendent of public instruction at Sherman, and Mr. C. G. Crawford, of our committee, who, by the way, is the senior member of one of our largest publishing houses in New York, and a keen judge of educational matters, including schools, teachers and textbooks. We came away feeling a respect for the town we had never felt before. She is second to no town of her size in either intelligence or effectiveness.

There are five public schools in Sherman which we visited, namely, the Public High School, the Franklin Building, the Washington Building, the Jefferson Building and of colored schools, the Fred Douglass Building. All seemed in a prosperous condition. The new high school building was completed during the past year and it has been of almost inestimable advantage to the high school department. It is a building which will be a credit to the city for years to come, and Sherman may well be proud of it.

IX.

BROWNWOOD AND GAINESVILLE.

WE found at Brownwood eleven church buildings, all new, handsome stone and brick structures, in which education seemed to vie with religion, and also four public school buildings and two colleges. The colleges are denominational schools and both have buildings worth about $40,000 each, and are well patronized for a town of that size.

Gainesville has also several fine schools. The High School was particularly imposing, and we found the inside in keeping with its splendid exterior. The schoolrooms were of the latest and most approved designs and the classes were excellently taught. We visited also the South School, the East School and the Colored School, and Gainesville may well feel flattered at being able to show such structures and such good attendance.

The reception at Gainesville was a most enjoyable occasion. Among other speakers Colonel Metz, who is a member of the New York Board of Education, was called upon for an address, and as his remarks have a direct bearing upon the subject before us, we subjoin them herewith:

> "I have been much impressed by the vast mineral and natural resources of your State, but to my mind you have one resource that surpasses all the others, and that it your school system. I have been connected with the school system of my home city and have been interested, for that reason, particularly in school work, and do not hesitate to say that the school system of Texas compares favorably and is equal to that of New York. You have a magnificent school fund, while we have none. Some of you gentlemen from New York may not know it, but it is nevertheless a fact, that there are 43,000 children in our own Borough of Brooklyn, which is only a small part of the City of New York, who are attending school on half time, because we have not schoolhouses and seating capacity enough to allow them a full day's attendance, and have not the available funds to provide for them.

"Texas has magnificent school buildings, and in many towns they are large enough to meet the requirements for years to come, which is eminently proper. They are splendidly lighted and ventilated. The curriculum for the public schools is quite up to ours, as is also the standard of qualification for teaching. It has been our privilege and pleasure to meet many of the ladies of the State, and I am sure that with such mothers and such schools Texas is bound to have good citizens. I am also pleased to see that the schools of Texas are managed in a practical, business-like way and are kept out of politics; that the men of Texas are vitally interested in their schools and are giving them their best thought and attention.

"I congratulate the people of Texas on their advanced position in the matter of public education."

X.

THE SCHOOLS IN DALLAS.

WE are indebted to the retiring President of the Board of Education for public schools in Dallas for a full report of the schools of that large city, a city containing over 55,000 people and ten public white schools and five colored schools. The following table gives the names of these schools and the average attendance during the past scholastic year:

ENROLLMENT FOR 1900 OF PUBLIC SCHOOLS IN DALLAS.

	Total Enrollment.
Central High School	743
East Dallas School	708
Cumberland Hill School	595
McKinney Avenue School	568
Cedar Lawn School	521
Oak Grove School	459
San Jacinto School	467
Columbian School	466
Alamo School	282
Bryan Street School	196
Total White	5,005

COLORED SCHOOLS.

High School	501
School No. 1	256
School No. 2	273
School No. 3	98
School No. 4	385
Total Colored	1,513
Total White and Colored	6,518

It is worthy of note that the total enrollment for 1900 surpasses that of the preceding year by 287 pupils. Of this increase 211 pupils were in the white schools and 76 pupils were in the colored schools. In the white schools the increase was 4.6 per cent., and in the colored schools it was 5 per cent.

We notice also that during the first months of the scholastic year the increase in the enrollment over that of the corresponding months of last year was more than 500 pupils. This large increase would have been maintained throughout the year had it not been for the fact that the overcrowded condition of the schools became so generally known as to deter patrons from sending their children who were not entered in the early months of the term. This will be remedied in the near future, for Dallas is not to be left behind in the race for suitable and commodious buildings in which to accommodate her rising and rapidly-increasing population.

SYSTEMATIC PHYSICAL CULTURE.

YOUR committee were especially pleased with the high grade of physical culture.

Realizing the importance of giving systematic attention to the children's physical as well as mental development, the effort was made to give them regular and methodical exercise in physical culture. The teachers of each grade held a monthly meeting for the purpose of outlining the work for the next month and of discussing the best methods of presenting it. In each of the grades a teacher, peculiarly fitted by training or

experience for such a duty, was designated to give the teachers a drill in physical culture which they in turn could carry to their respective schoolrooms and give to their pupils as a part of their regular daily program.

By this plan the physical effects of protracted confinement in overcrowded schoolrooms and of close and tedious application to text-books is reduced to a minimum, and in most cases entirely overcome.

PENMANSHIP AND DRAWING.

YOUR committee were particularly pleased with the system and successful work in music and drawing.

Never before has the work in these departments seemed to have been so successfully done. The adoption of a new and late series of music readers, containing songs with which the children were not familiar, greatly increased the interest and enthusiasm in this department. Wherever this course is pursued there will be no abatement of interest in this subject, and the softening, refining and uplifting influence of happy, cheering song will be truly felt in the hearts and seen in the faces of all the children, and will contribute to many happy hours in their homes.

We notice, too, that the specimens of drawing collected during the year indicated increasing skill on the part of both teachers and pupils. As in music, the importance of this branch of study ought not to be overlooked. There is an increasing demand for such modification or enlargement of present educational methods as will train the hand of the child, as well as the head and heart. This demand has its foundation in sound reason and must be heeded. The first step in this direction and the connecting link between the present and the coming educational systems is drawing.

The only subjects that require children to work with their hands are penmanship and drawing. Every other subject teaches them to *know* something, but only these teach them to *do* something. In the training of the hand and the eye and in the development of tastes and judgment the educational and practical value of drawing is recognized. Hence, the impor-

tance of giving the children the advantages of a subject that teaches them to *do* as well as to *know*, and in this the officers of the Dallas public schools have succeeded admirably and are to be congratulated. Indeed, our Northern schools may well take a lesson from them.

THE STATE FEDERATION AT DALLAS.

IT was here in Dallas that we met the State Federation of Educational Women's Clubs at their annual meeting; a lively contest was just then going on for the annual election of officers for the coming year. This Federation of Women's Clubs in Texas is particularly deserving of consideration. It is as yet young in years, but it has manifested a lively and practical interest in the public schools and in the public school teachers throughout the entire State. The following are the principal avenues through which this great Federation of Women's Clubs tender their practical and efficient assistance to the public schools: (1.) The organization of mothers' clubs for the study of child life in its relations to the school. (2.) The introduction of the kindergarten, wherever practicable, into the public schools. (3.) Aid and encouragement towards the introduction of manual training in the public schools, wherever it can be secured. (4.) To institute a system of free traveling libraries, especially in the public schools of the rural districts. (5.) To encourage the beautifying of school grounds by systematic tree-planting, and to assist in making the schoolhouses clean, healthful and attractive, and lastly, by an earnest co-operation with the trustees and the teachers looking to the growth and development of the public schools as a means to a better and broader conception of citizenship and a recognition of the general brotherhood of man. Miss Brackenridge, of San Antonio, the leading officer of the club, introduced Mr. Alvah Trowbridge, who spoke fittingly and eloquently of the usefulness of the Federation and of his pleasure to meet the ladies. Later Miss Brackenridge introduced the chairman of your committee, who had spent the early part of the day in visiting the schools and gaining information with which to frame this report. A reporter present took down Mr. Hallock's off-hand remarks, and as they make plain some facts in regard to the trip, and especially as they give the views of

your committee on the educational question in Texas more completely, we incorporate them in this report. After mentioning that he was present as the chairman of the Committee on Education of the Merchants' Association, and at Miss Brackenridge's request, Dr. Hallock spoke as follows:

"We came expecting to see a far-off and rather desolate country. We knew that Texas was a big State, having learned that from our geographies, but we were by no means prepared for the great-hearted hospitality of those who compose her Commonwealth. It has made brothers of us all, except the sisters, and, thank God, they were perfect before. We have found them so in this State. From the moment we entered its borders to the present time it has been one continued ovation with us. The ladies, bless them, are the best of us in every sense of the word, and we could never do without them. Some have asked us why we didn't bring our wives and our daughters along with us. We are going to do so next time. This visit is a mere experiment, and we were not quite sure what kind of a reception Texas might give us and them, and, like prudent men, we held our most precious goods in the background till we were certain that they would be safe if moved to the front.

"I am delighted more than I can tell you or express to meet so many representative ladies of the great State of Texas. I understand from your president that the 300 or 400 or more charming ladies before me are all representative of their various associations throughout the Lone Star State, and that through them I am addressing the entire women of the great State of Texas. I am sure of one thing, and that is that there is no State in our broad Union that could show a more intelligent or more beautiful collection, and if these are representative women of Texas I say give me Texas women every time. Of course, we all smile when a bright, cheerful, handsome and intelligent lady smiles graciously upon us. It makes us feel that even a man—the great, awkward animal the Lord seems to have created to form a suitable contrast with the fairer part of creation—I say that even a man may be worth something when he is thus noticed by his superiors. Well, we shall all grow younger by this visit. And, by the way, I was asked to say a word as chairman of the Committee on Education. I will only say this: We have visited nearly all the schools of every large city

and town in Texas, and we are surprised at the evidences of improvement and progress that is being made. Your schools compare favorably with those of the older States. Your school fund is the largest of any one of the States, and your schoolhouses are superb. We go back with new experiences and ideas of your great and beautiful State. Its present is almost all that could be desired and more than could have been expected, and its possibilities are boundless. We are proud of our big brother, and we shall never forget that Old Glory waves its beautiful stars and stripes over the Lone Star and the Empire State alike."

In conclusion your committee have been amazed and delighted with the educational outlook in Texas. It has been a real pleasure to visit the various schools and institutions of learning, and the teachers, superintendents, officers and pupils have seemed so intelligent and up to date that we returned to the Empire State feeling that Texas is not only a peer of our own State, but that she is rapidly taking a leading hand in educational matters, and that as in size so in intelligence and improvement, she is destined to stand at the head of the procession.

JOSEPH NEWTON HALLOCK, D.D., S. T. D.,
Chairman,

CHARLES G. CRAWFORD,
HERMAN A. METZ,
Committee.

TEXAS LEGISLATION AND ITS TENDENCIES.

I.
INTRODUCTORY.

IT was happily put by one of the speakers from Texas when he said that:

"Texas has been as much misunderstood in New York as New York has been misunderstood in Texas."

Any attempt at analysis of the scheme of Texas laws and legislation from a New York standpoint would simply result in the axiomatic finding that "What is one man's meat is another man's poison."

Texas' laws are better fitted for Texas and New York's laws are better adapted to New York transactions.

If it be true that from the New York standpoint Texas' scheme of legislation seems in any wise deficient or even burdensome, just so far is it equally true that upon examination from the standpoint of Texas' requirements New York's theory of legislative justice would be found equally open to criticism. Therefore, no examination, exhaustive or otherwise, into the history, growth and structure of Texas from a legal standpoint, whether embodied in her legislative enactments or the decision of her judges, has been made or attempted.

From a purely academic standpoint no report, therefore, can be of great interest, but from the practical standpoint it seems not inappropriate to say that your committee has formed certain impressions from contact with the people, with the members of

the Legislature, with the judges and with the members of the Bar of the State of Texas.

The character, intelligence, fitness and integrity of these elements might seem to be more fundamental and quite as important as the mere language law of the statute, or the interpretation of these statutes by the courts.

Statute law is nothing more than the formulation of public opinion expressed in the shape of legislative exactment, and case law is but the interpretation of individual judges of such legislation.

The character of the people dominates the public sentiment, which in turn creates the statute. The character of the legislator becomes an integral part of the legislation, while the same element in the members of the Bench and Bar impresses itself upon the interpretation of public opinion thus formulated by the Legislature and thus interpreted by the courts.

In general it is true that all statutes and decisions must be eventually governed and controlled both in their enactment and in their administration by an intelligent public opinion.

On the other hand, it is equally well established that no law which is contrary to the best public sentiment can long be sustained. Public sentiment always precedes legislation, and in turn legislation always follows the course indicated by the best public opinion.

To a limited extent the same is true with regard to the decisions of the courts.

No decision can long prevail, or stand unreversed and unmodified, if that decision is contrary to the sentiment prevailing among the best and most intelligent classes of the citizens of any State.

Neither legislators nor judges nor members of the Bar can successfully stand out against a sound, widely spread public opinion.

The phraseology of the statute, the language of the judges, are therefore of lesser importance than the foundation of all legislation.

II.
THE CHARACTER OF THE LEGISLATURE.

THE inquiry in this respect was made with care, and in divers parts of the State, and, what is more important, from men who knew the facts and whose relations were such that they were not prejudged in favor of the legislation of the State of Texas.

The situation is summed up in the expression of a gentleman well versed in these matters, who said "that the Legislature might be charged sometimes with being prejudiced, it had been urged that some were ignorant, but no man had asserted, and sustained the statement, that they were dishonest."

"To the humblest member of the legislature," he added, "argument for or against a bill must be addressed to the head of that legislator and not to his pocket."

To the extent that this statement is accurate, to that extent the State of Texas is to be congratulated as being entitled to a high rank among the best States of the country. With legislation that is honest no State is in danger of going wrong and continuing wrong.

III.
AS TO THE CHARACTER OF THE BENCH.

YOUR committee, from personal contact with the judges of the State, were impressed with the fact that they were inclined to be rigidly honest and impartial in the administration of justice.

More than this, that there seemed to be no affiliations or relations, social, political or otherwise, by reason of which certain members of the Bar were preferred as against others not so situated.

An impression was derived by your committee that sometimes the interpretation of the statute was based upon the belief that

this interpretation correctly expressed the will of the people as enacted by the legislation, but that in some instances the individual and unofficial judgment of the judicial officer might differ from his opinion as an officer of the court. The laws of the State of Texas are honestly administered by the judges as they find them.

Some members of the Bench have had a wider contact with the world than individual members of the Legislature, and are, therefore, broader in their views. They recognize the dangers of unlimited language as found in some of the statutes, and endeavor to impress broader views upon what is sometimes narrow legislation.

IV.
THE BAR OF THE STATE

were found to be energetic, active men of pronounced individualism, and of character.

From the cold New York standpoint perhaps oratory stands upon a higher plane in Texas than in New York. Oratory in the State of Texas is certainly not a lost art, as it has been said to be in the East. True it is that juries are apt to be swayed by the eloquence of the advocate, and perhaps more in Texas than in New York, but, after all, inasmuch as eloquence is not an unknown quantity or a matter of rarity, inasmuch as every Texan is an orator, the question presents no difficulty because of the preponderance of weight given to oratory.

V.
LEGISLATION.

ONE finds that among the legislation which has been most criticised in Texas is the Anti-Trust law.

The provisions of this Anti-Trust law are a reflex of a popular antipathy against monopolies; they seem to be a protest against

the suppression of individualism, and to the extent that they properly represent these principles they are not open to harsh criticism.

True, the various anti-trust acts betray sometimes the "fatal gift of oratory" in the framer of the legislation; the acts contain much, which, so far as could be ascertained, it is not generally expected will be literally carried out to their logical extent.

Without being unjust, the act may be criticised as somewhat extravagant in language, carrying to an illogical extent the principle of the protection of the individual against the encroachment of the monopoly.

One might incline to the belief that if the Legislature of Texas were to-day to draw afresh an anti-trust act which should express the opinion to-day prevailing among the larger in number and better in class of citizens of that State, that different, more temperate language and less words would be used than at present upon the statute books.

One is irresistibly led to the conclusion that the anti-trust acts of to-day are, to a certain limited extent, in the nature of landmarks of a former opinion which to-day does not prevail to the same extent.

We are not to be understood as saying that Texas to-day would have no anti-trust act. We do not mean to intimate that Texas should have no law tending to correct what every one must recognize as the dangerous tendencies of large combinations, but we do believe that it would be to-day expressed in different form and would not be open to the suggestion of going further than it was intended to go—viz., beyond the mere pale of effecting a suppression of wrongs, and into the field of making dangerous acts which otherwise seem quite legitimate.

As to the anti-trust act, one sums up the position in the single statement, that as a protest in favor of individualism, and as an attempt, however vigorous, to recognize the dangerous tendencies of modern large combinations, it is not to be carelessly criticised, although it may be true, from the New York standpoint, the dangers of these combinations have been overestimated in Texas, and the language of the statute overshoots the mark of to-day and threatens honest business enterprises.

To say that the language of the anti-trust act of Texas does not deter certain legitimate capital from coming into

Texas is to deny the fact that more people are frightened by thunder than are killed by lightning.

In financial matters it is the preliminary impression upon which the capitalist acts as a rule in seeking to locate capital rather than experience derived after action in this respect. Nothing is so timid as capital, nothing so easily deterred from entering a State and nothing so easily withdrawn.

The Texas anti-trust acts but represent the swing of the pendulum, and the true equilibrium, the true rule for dealing with trusts and combinations may be found to lie somewhere between the swing of the pendulum in New York and the reflex swing in Texas.

The growth of rationality has not been limited to New York during the past years, and one may rest assured of the fact that rationality will be the basis of Texas action in the future in dealing with the trust problem.

VI.

THE CORPORATION LAWS.

THE corporation laws of the State of Texas reflect to a limited extent a prejudice more former than present against corporations. It may be suggested that the corporation laws lack some of the more modern provisions for the modern business companies; that they fail to provide for certain every-day wants and needs of the business corporations. But such matters are sure to be corrected at the hands of an intelligent legislature as soon as the State of Texas shall have fully and practically experienced what to-day is certainly coming into its borders, viz., the movement and growth of the modern business company, and the tendency of business and business men to transact their business in proper corporate, rather than in individual form.

VII.

THE HOMESTEAD ACT

has been the subject of criticism.

This act seems to be the enunciation of the principle, as the Texan sees it, of the preservation of the home and the protection of the children, the widow and the orphan.

The Texan properly says that this statute is clearly on the books, and that every one dealing with Texas has full notice of its provisions.

One agrees with the statement that every State has its laws of exemption, and that if the State of Texas has a broader law of exemption than some other States, it is a matter with which Texans alone are directly concerned, for the reason stated that outsiders dealing with Texas have full knowledge of its reservations and its provisions.

On the other hand it cannot be successfully denied that in some instances attempts have been made by persons lacking in the delicate sense of integrity to avail themselves of the provisions of this act for the purpose of evading creditors.

But this leads to the suggestion that in Texas, as in all other States, there are some people who try to avoid the payment of just obligations.

The courts of Texas are, however, inclined to construe the Homestead Act fairly.

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ing investment in Texas, which are willing to be governed in Texas by Texas laws and customs, and do not seek to be regulated by New York law and custom, seem quite as safe in Texas as elsewhere.

JAMES B. DILL,
Committee on Law.

New York, Dec. 3, 1901.

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